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IN THE SPECIFICATION:

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BACKGROUND OF THE INVENTION

This invention is a continuation of serial number 10/094,833 filed March 10, 2002 which is a continuation-in-part of serial number 08/979,735 filed on 11-26-97, now patent number 6,356,724, which is a continuation-in-part of serial number 08/896,491 filed 7-18-97, now patent number 5,878,306, which is a continuation-in-part of serial number 08/370,968, now patent number 6,552,780, which was filed on 1-10-95. This invention relates to solving problems in imaging machines as well as toner cartridges used in Xerography and more specifically in the toner cartridge remanufacturing industry. This includes copiers, laser printers, facsimile machines, or any other imaging machine. However, this invention may also relate to these copiers, laser printers, facsimile, or other imaging machines as well as the toner cartridges used in these imaging machines. The users of this invention will typically be toner cartridge remanufacturers as well as service technicians.

CANON has designed an all-in-one cartridge as in Patent Number 4,975,744, issued 12-4-90 and assigned to CANON. Several companies have used these cartridges in laser printers, copy machines and facsimile machines, each with the varying printer engines and a different nameplate. Originally, these cartridges were designed to be "disposable". However, after the first all-in-one toner cartridge was introduced, it did not take long before laser cartridge remanufacturers such as myself began remanufacturing cartridges. These "disposable" cartridges were designed to function for only one cartridge cycle without remanufacturing. The remanufacturers had found certain components that needed replacement on a regular basis. In 1990, the first aftermarket

photoreceptor drum became available for use in remanufacturing the all-in-one cartridge of the "SX" engine variety, the most popular printer cartridge from around 1987 through 1996. When the long-life photoreceptor drum became available, the entire remanufacturing industry turned around and gained credibility and began a huge growth surge that still continues. In October 1993, HEWLETT-PACKARD, the largest seller of this printer engine using the all-in-one cartridge, entered the cartridge remanufacturing industry with the "Optiva" cartridge, further increasing the size as well as credibility of this relatively new industry. However, this relatively new industry grew from the all-in-one cartridge shortly after its debut. Before the introduction of the long-life drum, sometimes called the "superdrum" or "duradrum", the SX cartridge would last for around three cartridge remanufacturing cycles at best, since the maximum useful life of the OEM drum was three cycles. However, the long-life drums got their names from the fact that they were designed to last for many remanufacturing cycles or recharges as they are sometimes called. Typically, the long life drum can last for ten or more such cycles, unlike the typical OEM (Original Equipment Manufacturer) drum. With the additional developments of drum coatings, originally designed for OEM drums, the long-life drum may last for many additional cycles. Some coatings, in theory, were designed to be dissolved and removed from over the drum surface every 1-3 cycles, so the drum life of the long-life drum almost seems limitless.

However, with photoreceptor drums lasting for many cycles and replacement drums available, other components of the cartridge have a tendency to require greater durability, and longevity. Also, as the success of these cartridges has

skyrocketed, the demand is for cartridges with longer cycles, so component improvements are significant. Therefore, avoiding natural problems with prevention means must also be implemented for cartridges of longer life both in longer cycle times and greater number of cycles.

This is true of all the various flexible components that need to be replaced or added to these devices (toner cartridges, laser printers, copiers and facsimile machines), particularly plastic flexible components as well as flexible elastomeric components. Inventor will receive patent number RE35529 that will be issued on 6-10-97 that uses a setting or positioning device of this kind to install a shipping seal assembly, so, a concept has been developed by inventor that may be used in other applications. However, inventor has realized that the concept may also be used on elastomeric blades, plastic blades and thin metal blades that go into the machines and toner cartridges. Some of these blades include but are not limited to the recovery blades otherwise known in the art as catcher blades, sweeper blades, keeper blades, keepers, MYLAR blades, recovery blades on the waste hopper, recovery blades in the toner hopper, strips, doctor blades, metering blades, spreader blades, strips, doctor blades, plastic strips, urethane rubber strips, wiper blades, scraper blades, toner scrapers, drum cleaning blades, cleaning blades, urethane blades, and blades. In the remanufacturing industry and in the service technician industry, various strips get kinked, wavy, bowed, warped just from performing the service or remanufacturing. Sometimes the blades need replacement just from age-wear problems. For example, in the typical case for most any toner cartridge, just from vacuuming a waste toner hopper, the recovery blades and cleaning blades may get kinks caused by suction of the vacuum cleaner. As remanufacturers desire speed in the remanufacturing process, vacuuming the hoppers

can cause these problems with the desire for greater suction to achieve greater speed. Cost is money. Even without the high suction, these problems can occur. Inventor has patents number 5,237,375, 5,500,128 and 5,479,250 that deal with placing a permanent stiffener on the blades to reinforce them, both wiper blades (drum cleaning blades), spreader blades, and recovery blades as well as conductive coatings that aid in many ways. These conductive coatings may also be used in conjunction with this invention as well as making any of the mentioned blades of conductive plastic and/or rubber.

In the IBM-4019/4029/4039 series of cartridges, there are various plastic blades in the toner hopper that easily kink or otherwise get deformed and need replacement in the remanufacturing process. Consequently, these blades also need replacement. Not replacing these blades fairly regularly means cartridge failure because just the remanufacturing process itself can cause the blades to fail, kink, wave, flip, bend backwards, flare, warp, curl, loosen, stretch, or otherwise deform. There are blades on the toner hopper section that need replacement as well as on the waste toner hopper section.

In most imaging machines and toner cartridges there is a urethane rubber spreader blade that spreads the toner on the developer roller and charges the toner in the process. These blades often need replacement. Inventor also has patent number 5,546,162 that deals with method, device and kit for addition or replacement of spreader blades that can be improved further with this invention or even replaced with this invention. This invention may be also applied as well to wiper blades otherwise known as drum cleaning blades, to replace the urethane blade on a metal frame or even

to the toner cartridge frame in some designs of the future.

Most recovery blades use the pressure-sensitive type self-adhesive type with a release liner and are very thin, made of MYLAR or other thin plastic approximately five thousandths of an inch thick and therefore (generally ranging but not limited to around two to 50 thousandths of an inch thick), are very flimsy and difficult and tedious to install. Some people sell a install tool that must be installed separately for each recovery blade. This device consists basically of a plastic V-strip spring-clamp similar to a cheap plastic temporary removable bookbinder which has a spring pressure and squeezes the strip tight to grip it. To use this tool, the installer squeezes the plastic strip install tool to spread the clamp like opening to open it up. Then he places the recovery blade strip inside the spring-clamp install tool. Then he lets go from squeezing the tool whereby the tool exerts a squeezing pressure on the recovery blade and thereby grips the recovery blade. Then, the bookbinder tool is used as a firm handle to place or position the recovery blade in place and after the recovery blade is installed, the tool is again squeezed to remove it easily from the recovery blade. One disadvantage of this system is that the installer must individually go through the full lengthy procedure of installing and uninstalling the spring-clamp install tool for each individual recovery blade to be installed.

This invention may also be used for installing replacement blades in hoppers and waste hoppers, retaining blades, and also, of course, for paddlestrip blades. Paddlestrip blades are blades usually of plastic or urethane that are attached to a rotating metal frame known as the "paddle" that helps wipe the waste toner off the photoreceptor and then scoop this toner into the waste toner hopper. It can also be

called the sweeper blade, scooper blade, the sweeper, the scooper, or the trash collector blade among other names.

With this invention, a flat removably adhered install device comes pre-installed on each individual strip and after each strip is installed, the device is merely peeled or otherwise removed very simply. Device removal after strip installation is simpler than peeling a banana peel because only one strip is peeled, whereas a banana peel requires several strips to be removed. Similarly, this device is easier to remove than having to remove the spring-clamp install tool because firstly, the device is pre-installed on every strip in the manufacturing process and secondly, the strip peels off easily like a banana peel. Also, the throwaway install device can in some manufacturing processes improve the manufacturability of the blade-product, depending on how sophisticated one gets. Read the rest of the patent to find out how this works.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to make an install tool stiffener positioning device manufactured as a component of a recovery blade for easy install that is removably adhered to the recovery blade and after the recovery blade is installed, the install tool stiffener is peeled off of the recovery blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a drum cleaning blade for easy install that is removably adhered to the drum cleaning blade and after the drum cleaning blade is installed, the install tool stiffener is peeled off of the drum cleaning blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a spreader blade for easy install that is removably adhered to the spreader blade and after the spreader blade is installed, the install tool stiffener is peeled off of the spreader blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of a doctor blade for easy install that is removably adhered to the doctor blade and after the doctor blade is installed, the install tool stiffener is peeled off of the doctor blade.

It is a further object of this invention to make an install tool stiffener positioning device manufactured as a component of any blade for easy install that is removably adhered to a blade of any type, plastic or elastomeric, and after the blade is installed,

the install tool stiffener is peeled off of the blade.

It is a further object of this invention to make a tear-seal assembly that has features of adhesive masking for the purpose of reducing the pulling pressure required for the initial tear and/or final tear. The adhesive masking may be made repeatably and with precision using a kiss-cut on the release liner that many adhesives use in packaging/storing as a protective liner to protect the adhesive properties of an adhesive tape material used as a component of a seal assembly.

It is a further object of this invention to make a tear-seal assembly using a positioning support, a conductive tear-portion, a conductive tear-guide, a conductive base portion, a conductive ribbon material, a tear-guide, and/or a material that tears straight that does not require a tear-guide, with an initial starter tear, and/or without an initial starter tear.

It is a further object of this invention to make an improved toner hopper with the improved tear-seal assembly, an improved toner cartridge and/or an improved image forming apparatus using the improved seal assembly.

It is a further object of this invention to make an improved method of manufacturing seal assemblies with the features described, including a process of forming a kiss-cut release liner from the protective liner protecting adhesive properties of a tape component of a seal assembly including the process of using the actual release liner or protective liner that protects the tape for adhesive masking.

In carrying out this invention in the illustrative embodiment thereof tape that is protected with a protective release liner is used in the manufacture of a seal-insert component. A kiss-cut is formed in the release liner to separate a masking portion which blocks adhesive from a non-masking portion so that the seal will tear easier. The non-masking portion of the release liner is removed during the assembly process, and the masking portion of the release liner stays in the seal assembly to block adhesive. It is also novel that the kiss-cut release liner is formed in the same operation as cutting the usually rectangle portion of the seal assembly with an opening, and thus, no extra labor is required in the manufacturing process when using the kiss-cut release liner to mask adhesive.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention, together with other objects, features, aspects, and advantages thereof, will be more clearly understood from the following description, considered in conjunction with the accompanying drawings.

Figure 1 is an isometric cutaway view of a prior art waste toner hopper assembly.

Figure 2 is a side view of a prior art waste hopper and photoreceptor in theory.

Figure 3A shows a side view of a prior art spring clip from the bookbinding industry.

Figure 3B shows an isometric view of a prior art bookbinding clip.

Figure 3C shows a shipping seal as used in a toner hopper.

Figure 3D shows a shipping seal with a stiffener as used in a toner hopper.

Figure 3E shows an installed shipping seal in a toner hopper.

Figure 4 shows the mechanics of an imaging machine.

Figure 5 shows a prior art side view cutaway of a toner hopper.

Figure 6A shows an isometric view of a prior art recovery blade.

Figure 6B shows a side view of a prior art recovery blade.

Figure 6C shows an improved recovery blade in isometric view.

Figure 7A shows an improved recovery blade assembly in isometric view.

Figure 7B shows a side view of an improved recovery blade assembly.

Figure 7C shows a further improved recovery blade assembly.

Figure 7D shows an even further improved recovery blade assembly.

Figure 8 shows an isometric cutaway view of the technician removing the adhesive protective liner from the improved recovery blade assembly.

Figure 9 shows an isometric view of the technician preparing to install a recovery blade assembly.

Figure 10 shows an isometric cutaway view of the technician furthering the procedure of installing the recovery blade assembly onto a waste toner hopper.

Figure 11A shows an isometric cutaway view of the removal of the stiffener positioning tool from a waste toner hopper.

Figure 11B shows a cutaway view of a waste toner hopper with an improved recovery

blade assembly partially installed.

Figure 11C shows an isometric view of an ergonomic recovery blade with a user-friendly handle.

Figure 12 shows an isometric cutaway view of a further step in the installation of the recovery blade assembly, the removal of the disposable stiffener device.

Figure 13 shows a pickup magnet sheet assembly in isometric view.

Figure 13A shows a side view cutaway of a section of the pickup magnet sheet assembly.

Figure 14 is a cutaway isometric view of a waste toner hopper showing the relationship between the pickup magnet and the recovery blade.

Figure 15A shows a new and improved recovery blade assembly.

Figure 15B shows a new and improved recovery blade assembly.

Figure 16 shows a prior art frame of a doctor blade assembly from an SX toner cartridge.

Figure 17 shows an isometric view of a converted SX doctor blade into a spreader blade.

Figure 18 shows a prior art LX spreader blade.

Figure 19 shows a prior art NX spreader blade.

Figure 20 shows a prior art converted doctor blade into a spreader blade.

Figure 21A shows a new and improved assembly jig in isometric view used for installation of a doctor blade into a spreader blade conversion.

Figure 21B shows an SX doctor blade as it is placed into the assembly jig for a conversion process into a spreader blade.

Figure 22 shows the new and improved spreader blade in cutaway view.

Figure 23 shows the beginning process of installation of the spreader blade onto a doctor blade to make a spreader blade assembly.

Figure 24 shows a cutaway isometric view of a spreader blade conversion process further along.

Figure 25 shows an isometric view of the conversion process further yet along.

Figure 26 shows a cutaway isometric view of a further step in the doctor blade to spreader blade conversion process.

Figure 27 shows the doctor blade converted into a spreader blade.

Figure 28A shows another device and process for converting a doctor blade into a spreader blade.

Figure 28B shows another view of a new and improved device for placing a spreader blade on a frame.

Figure 28C shows another new and improved device for placing a spreader blade on a frame.

Figure 28D shows another view of a new and improved device for placing a spreader blade on a frame.

Figure 29A shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 29B shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 29C shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 30 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 31 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 32 shows a cutaway isometric of a spreader blade shape for improved adhering to frame.

Figure 33A shows an isometric view of an improved wiper blade assembly device and method.

Figure 33B shows an isometric breakdown view of an improved wiper blade assembly device and method.

Figure 34 shows a shipping seal assembly.

Figure 35 shows the process of assembling a shipping seal on a toner hopper in isometric view.

Figure 36 shows a component of a conventional shipping seal, the tear subassembly.

Figure 37 shows a component of a conventional shipping seal, another tear subassembly.

Figure 38A shows a seal-insert subassembly of a shipping seal in isometric view.

Figure 38B shows an improved seal-insert subassembly of a shipping seal in isometric

view.

Figure 38C shows an improved seal-insert subassembly of a shipping seal in isometric view.

Figure 38D shows an improved seal-insert subassembly of a shipping seal in isometric view.

Figure 38E shows an example of a die for die cutting a seal-insert subassembly of a shipping seal assembly which after the die-cutting process will have adhesive masking.

Figure 38F shows an example of a die for die cutting a seal-insert subassembly of a shipping seal assembly which after the die-cutting process will have adhesive masking as it is about to begin the process of cutting a multilayer material to form a seal-insert.

Figure 38G shows an example of a die for die cutting a seal-insert subassembly of a shipping seal assembly which after the die-cutting process will have adhesive masking shown during the process of cutting a multilayer material to form a seal-insert and forming the kiss-cuts.

Figure 38H shows an example of a seal-insert subassembly of a shipping seal assembly after the die-cutting process which has adhesive masking shown after the process of cutting a multilayer material to form a seal-insert with kis-cuts showing the process of the seal-insert being removed from the unused waste material.

Figure 38I shows an example of a seal-insert subassembly of a shipping seal assembly after the die-cutting process which has adhesive masking that was kiss-cut during the process of cutting a multilayer material to form a seal-insert shown above its die of Figure 38E.

Figure 38J shows the seal-insert of Figure 38I flipped over.

Figure 38K shows an example of a seal-insert subassembly of a shipping seal assembly after the die-cutting process which has adhesive masking shown after the process of cutting a multilayer material to form a seal-insert shown after the process of the seal-insert being removed from the unused waste material.

Figure 38L shows a cutaway view of a seal-insert subassembly of a shipping seal assembly after the die-cutting process which has adhesive masking shown after the process of cutting a multilayer material to form a seal-insert showing the process of the center waste portion being removed from the seal-insert where the bottom release liner of the center portion is not removed.

Figure 38M shows a cutaway view of an example of a seal-insert subassembly of a shipping seal assembly after the die-cutting process which has adhesive masking shown after the process of cutting a multilayer material to form a seal-insert showing the process of the center waste portion being removed from the seal-insert where the bottom release liner of the center portion is included in the removal.

Figure 38N shows an example of a seal-insert subassembly of a shipping seal assembly

after the die-cutting process which has adhesive masking shown after the process of cutting a multilayer material to form a seal-insert and after the process of the center waste portion being removed from the seal-insert where the bottom release liner of the center portion is included in the removal.

Figure 38o shows a seal-insert of Figure 38N during the process of removal of the release liner at the non-masking region showing how the release liner of the masking region stays on the seal-insert.

Figure 38P shows a portion of the die-cutting process of a seal-insert where two levels of cut are made so that the seal-insert is cut through all the way through to form the seal-insert, while a masking portion of the release liner is not cut through all layers and a second release liner on the underside is not cut all the way through that is typically used to form the seal-insert of Figure 38L.

Figure 38Q shows a portion of the die-cutting process of a seal-insert where two levels of cut are made so that the seal-insert is cut through all the way through to form the seal-insert, while a masking portion of the release liner is not cut through all layers and a second release liner on the underside is cut all the way through that is typically used to form the seal-insert of Figure 38M.

Figure 38R shows a process of installing a tear-able material and a tear-guide being installed onto a seal-insert.

Figure 38S shows a process of installing a tear-able material without a tear-guide

being installed onto a seal-insert.

Figure 39 shows a shipping seal assembly.

Figure 40 shows a new and improved shipping seal assembly.

Figure 41 shows a toner hopper with an installed sidewall seal.

Figure 42 shows an isometric view of an improved sidewall seal assembly over a cutout portion of a toner hopper where the seal is to be installed.

Figure 43 shows a new and improved sidewall seal with the liner being peeled.

Figure 44 shows part of the installation process of a prior art sidewall seal into a cutaway isometric of a toner hopper.

Figure 45 shows part of the installation process of a sidewall seal into an isometric cutaway toner hopper.

Figure 46 shows an isometric of a further improved sidewall seal.

Figure 47 shows a side view cutaway of a toner hopper with an installed sidewall seal.

Figure 48 shows a prior art sidewall seal, toner hopper and cutout toner cartridge attach area.

Figure 49 shows a new and improved sidewall seal in isometric view.

Figure 50 shows a new and improved brace positioning stiffener device for installing a sidewall seal.

Figure 51 shows a prior art shipping seal.

Figure 52 shows an improved version of the prior art shipping seal of Figure 51.

Figure 53 shows a prior art seal-insert, top view.

Figure 54 shows a prior art seal device.

Figure 55A shows the prior art shipping seal installed on the modular seal-insert.

Figure 55B shows at shipping seal assembly.

Figure 56 shows where the seal-insert fits into the toner hopper.

Figure 57 shows an isometric view of the partially pulled shipping seal after it is installed into the toner hopper.

Figure 58 shows a prior art shipping seal and part of the process of installing it into a toner hopper.

Figure 59 shows a prior art shipping seal and part of the process of installing it into a toner hopper.

Figure 60 shows an improved device and process for installing the shipping seal of Figures 58 and 59.

Figure 61 shows an improved device and process for installing the shipping seal of a toner cartridge.

Figure 62 shows an improved device and process for installing a shipping seal of a toner cartridge.

Figure 63 shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 64 shows a placement holder device (PHD) used for installing a shipping seal for a toner cartridge.

Figure 64a shows a prior art feed-guide on the end of a pull-strip.

Figure 64b shows another prior art feed-guide on the end of a pull-strip.

Figure 65 shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 65A shows a further improved device and process for installing a shipping seal into a toner cartridge.

Figure 65B shows an improved device and process for installing a recovery blade seal or any other blade into a toner cartridge.

Figure 66 shows a gang of PHD's, placement holder devices packaged together for ergonomic use.

Figure 66A shows another gang of PHD's, placement holder devices packaged together for ergonomic use.

Figure 67 shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 67A shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66A.

Figure 68 shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 68A shows a preliminary step in the continuous manufacture of the placement holder device of Figure 66.

Figure 69 shows a preliminary step in the continuous manufacture of the placement

holder device of similar to that of Figure 66.

Figure 70 shows a packaging configuration and method of shipping seal such as that of Figure 62-63.

Figure 71 shows a packaging configuration and method of shipping seal such as that of Figure 62-63.

COMPLETE DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows a section 1 of a conventional waste toner hopper 2, a component of a toner cartridge as used in laser printers, copiers, facsimile machines, or any other imaging or Xerographic machine. A waste toner hopper 2 is located adjacent the photoreceptor drum 3 as illustrated broadly in Figure 2. After transferring the dry toner image from the drum 3 to the output paper during the printing process, the photoreceptor drum 3 continues its rotation. Residual toner on the drum 3 is in contact with the keeper blade 4 or recovery blade 4 , forming a perfect seal so toner will not leak out of the waste toner hopper 2, yet allowing the toner to fall into the waste toner hopper 2, "keeping" the toner in the waste toner hopper 2 so it can't escape or "recovering" the waste toner in the waste toner hopper 2. That is why it is called the "keeper blade" 4 or "recovery blade" 4. As the drum 3 continues to rotate, the cutting edge 5 of the wiper blade 6 scrapes the residual toner from the photoreceptor drum 3. The toner falls through the slot 7 into the waste toner hopper 2. The scraped-off residual toner cannot leak or penetrate into the rest of the cartridge assembly because of the seal-contact maintained between the cutting edge 5 of the wiper blade 6 and the photoreceptor drum 3. Also, toner, in theory, cannot leak from the waste toner hopper 2 to the remainder of the cartridge assembly because of the existence of the seal provided by the keeper blade 4 against the drum 3.

Some waste toner hoppers 2 are designed so the keeper blade 4 is very tightly pressing against the photoreceptor drum 3. The keeper blade 4 may be tightly pressing against the drum 3 that as the drum 3 rotates, the keeper blade 4 may inadvertently scrape residual toner off the drum 3 before it is scraped off by the cutting edge 5 of the wiper

blade 6 to fall into the waste toner hopper 2. Residual toner prematurely scraped off the drum 3 can leak into the remainder of the toner cartridge assembly and printer, making a mess of other components and affecting the quality of the print on the output paper. Having the keeper blade 4 too tight to the drum 3 may also cause excess friction or heat, in turn causing premature wear or warpage or other deformation of the keeper blade 4 or wear down the drum 3.

A narrow strip of magnet, the pickup magnet 8 of Figures 2 and 14, about one thirty-second of an inch in width in the typical case (although it can greatly vary in different style waste toner hoppers 2), used in some waste toner hoppers 2 attracts some toner when the toner cartridge assembly is pulled out of the imaging machine and moved around and also picks up airborne toner that mixes in the air. Note that Figure 2 shows that the keeper blade 4 touches a thin surface of a pickup magnet 8, and the pickup magnet 8 also may be used to help secure the keeper blade 4 to the attach surface 27 of the waste toner hopper 2 i.e. preventing de-lamination of the keeper blade 4 in which the photoreceptor 3 is continually exerting a force upon the keeper blade 4, in a direction whereby if adhesive is not strong enough, it would cause de-laminating or peeling off of the keeper blade 4, the keeper blade 4 itself acting as a lever, is helped to prevent from levering off because of the existence and position of the pickup magnet 8. Attempting to vacuum the waste toner hopper 2 and keeper blade 4 can kink or otherwise deform or de-laminate the keeper blade 4 causing a leak and/or streak at the end-user 's location. Furthermore, the very installation process of the keeper blade 4 can cause a kink and cause a leak or streak at the user's location. With a better device and process of installation of the keeper blades 4 as will be shown in this invention, this problem will be decreased if not totally eliminated. Furthermore, with the

improved device of this invention, the manufacturing process of any style blades 4 themselves can be manufactured easier because a removably adhered installation stiffener positioning device is removably adhered to the keeper blade 4. By giving the keeper blade 4 stiffness, it is easier from a point of view of material handling in the manufacturing process. This includes cutting, slitting, die-cutting, flat die-cutting, rotary die-cutting, flat-rotary die cutting, stamping, or other operation, particularly of the continuous feed variety. Some urethane and plastic keeper blades are so thin that they are very difficult to manufacture without the process and device of this invention because thin urethane can stretch, fold, crease, pinch, wrinkle, tear or otherwise deform.

Figure 3A shows a side view of a plastic bookbinder spring-clip 9 used in prior art to hold the keeper blade 4 when it is being installed. Figure 3B shows an isometric cutaway view of the same prior art spring-clip 9. This spring clip 9 comes from the bookbinder industry and is used in many a school project to hold together reports and other school projects. The spring force of this spring-clip 9 holds the keeper blade 4 for use in the installation process. The problem with the bookbinder spring-clip 9 is that it requires two extra steps in the installation process. First it requires that the keeper blade 4 is placed or installed into the bookbinder clip 9 which is very tedious. Then, the keeper blade 4 is installed into the waste toner hopper 2. Then, the spring-clip 9 is released from the keeper blade 4 and the waste toner hopper 2. The bookbinder spring-clip 9 has been used for quite some time, and after this invention is released, there will be a reduced need if any of the bookbinder type clip 9 for installing keeper blades or other blades. The spring-clip 9 has an opening 50 where the recovery blade 4 is inserted which exerts a spring pressure to hold the recovery blade 4 in the

spring-clip 9 prior to installation. Even though the bookbinder clip 9 could become obsolete from this invention, some people may want to use the clip 9 with this invention. Pony clamp adaptations of the spring clip 9 have been around too in order to facilitate spreading open the clamp for installation of the recovery blade 4.

Figure 3C is prior art in this patent application because it was co-invented in the parent patent of this continuation-in-part. Figure 3C-3D shows a shipping seal assembly 109 which is patent pending by inventor, the parent serial number 08/370,968 of this continuation-in-part. The tear guide 89 provides a pull device for the end-user to pull from the user's location to release the dry toner powder after the tear guide 89 tears the tear material 93. It starts at the slits 91 and completes the tear at the slits 91 where the tail 90 remains. Figure 3D shows a seal assembly 110 from parent serial number 08/370,968 that consists of the same shipping seal assembly 109 but also containing a positioning stiffener 94 for easier installation of the shipping seal assembly 110. The edge remove handle 95 and end remove handles are sub-components of the positioning stiffener 94 for the purpose of making it easier to remove the positioning stiffener 94 after the shipping seal assembly 110 is installed. Figure 3E shows a prior art seal assembly being torn from the CIP parent patent toner hopper [[99]] 97 with an installed shipping seal assembly 110 covering the opening 99 in toner hopper [[99]] 97, shown after the positioning stiffener 94 was removed. Also shown in Figure 3E is the tear-guide 89 pulled partially which has caused the opening in the seal torn area 98 so that toner powder, previously trapped inside the toner hopper 97, may now fall through the opening 99.

Figure 4 shows the typical imaging system which includes, in theory not only the inner

workings of the toner cartridge assembly, but also what goes on in the imaging or Xerographic device as well. Typically, most of the moving parts that can wear or need replacement are kept in the disposable toner cartridge which can be recycled, thus rather than requiring a service technician's round-the-clock availability, a simple replacement of a new toner cartridge replaces the need for a service technician. However, a remanufactured cartridge made from the toner cartridge that was designed to be thrown away may replace the new toner cartridge. Thus, the toner cartridge remanufacturer, rather than a brand new toner cartridge replaces the need for the round-the-clock service of the imaging device. This way, the servicing is done off-site.

Everything is centered around the photoreceptor 3, which in this diagram is a drum or cylinder. Some photoreceptors are of the belt style and this invention applies to these imaging machines with belt photoreceptors as well, even though it is not shown in the figures. The photoreceptor 3 is initially charged by the primary charge roller or PCR 43. This PCR 43 rotates and supplies a voltage charge to the photoreceptor 3 and in so doing also charges over any residual image charge that may be left over on the photoreceptor 3 from a previous image, and thus, an erase lamp is not required. After the PCR 43 charges the photoreceptor 3, the laser beam scanner assembly 49 hits the drum 3 with an image in the form of pixel dots. Wherever the laser light shines on the photoreceptor 3, discharge of the charge provided by the PCR 43 takes place, forming an image on the photoreceptor 3, of what will be printed or copied. Wherever the light discharges will print black on the output page and wherever the charge is not hit with laser light becomes white. In some machines, the opposite takes place, but the theory would then be the same in reverse with light hitting where there is no image but I will

continue only with discussion where light makes black image on the output page. As the photoreceptor 3 continues to rotate, it next comes almost in contact with the developer roller 44 with a very precise space between them which supplies toner to the photoreceptor 3 in the form of the image. Toner jumps back and forth between the developer roller 44 and the photoreceptor 3 many times per second forming a "toner cloud" and the photoreceptor 3 takes what toner it needs and then the developer roller 44 takes back what the photoreceptor 3 cannot use. This process continues in "continuous flow" mode and the toner supply is replenished to the developer roller 44 from the toner hopper (not shown). In early versions of imaging machines, the toner on the developer roller 44 was metered with a doctor blade (not shown) that scrapes toner and leaves the desired thickness of toner remaining on the developer roller 44 as this toner comes near the photoreceptor 3. Using this technology proved inefficient because, a lot of waste toner or background clung to the surface of the photoreceptor 3 and either wound up as gray background or got scraped off the photoreceptor later in the process to get trashed into the waste toner hopper 2. However, eventually the industry standard changed from doctoring or metering blades to the spreader blade 45, a urethane blade on a frame usually made of metal. The advantage of the spreader blade 45 is that the toner when using the spreader blade 45, as it gets spread, also gets "rubbed" and thereby gets charged. The pressure between the spreader blade 45 and developer roller 44 is very important and also affects darkness of print, toner efficiency and quality. For example, in real life, this would be analogous to taking a balloon, rubbing the balloon on a wool sweater, then placing the balloon on a wall or ceiling surface. In the case of the balloon, the electrostatic charge of attraction between the balloon and the wall or ceiling exceeds the gravitational force on the balloon and, the balloon is suspended on the wall or ceiling. To carry this balloon analogy to imaging

and the spreader blade 45, the spreader blade 45 rubs the toner against the developer roller 44, and thereby charges the toner, and is said to increase the triboelectric charge of the toner. Charged toner behaves better than uncharged toner in the imaging process. This is, among other reasons, because the AC component of the bias voltage on the developer roller 44 attracts the toner from the photoreceptor 3 and alternates between attraction and repulsion many cycles per second. When the developer roller 44 repels the toner as it alternates its bias charge polarity, the photoreceptor 3 takes whatever toner it needs. As soon as the developer roller 44 attracts toner again, the charged toner is attracted back to the developer roller 44. The translation of this theory into real life is that the charged toner behaves as if it is lighter like the balloon. The charged toner is more controlled by the rapidly alternating attractions and repulsions of the developer roller 44 and by the charge an attraction of the photoreceptor 3 than by gravity. Thus, the toner, defying gravity, instead is controlled by electrostatic forces greater than gravity, is less likely to become waste toner that winds up in the waste toner hopper 2. The result of charging toner is that the drum 3 does not keep as much undesirable background toner which would have become background on the output page or waste toner in the waste toner hopper 2. Thus the darkness of the print on the output page is increased while at the same time the toner efficiency is also increased. This seems contradictory for both the toner efficiency and the darkness of the output page each to increase, however, if you think about the theory, it makes sense. Greater detail of this theory has been presented by the inventor in patent number 5,546,162.

As the photoreceptor 3 continues to rotate, after it has passed the developer roller 44, the page-image is now visible on the photoreceptor 3. If one were to turn off the laser

printer or copier in the middle of a job, at this position of the photoreceptor, you would see black toner powder on the photoreceptor 3, identical to the image that is to be printed on the page. Furthermore, although I do not recommend doing so, you can wipe this toner off the photoreceptor 3 as it, by attraction, clings to the photoreceptor 3 by attraction of charge where there is image and repulsion where there is no image, similar to the way a charged balloon on the wall is suspended on the wall where the charge of attraction of the balloon to the wall exceeds the gravitational force pulling the balloon toward the earth as discussed. The attraction of all toner particles to the photoreceptor 3 is greater than the gravitational force trying to pull the toner to the ground. So, although the laser light discharges the photoreceptor 3 charge, there is a charge remaining in these "discharged" pixels that is compatible with attracting the toner to the photoreceptor 3. Note that the dashed lines on the spreader blade 45 are a conductive coating 116 as shown in inventor's patent number 5,400,128 which is an option. Also, optionally, the material such as urethane may be loaded or heavily loaded with conductive material. One typical way to load a blade with conductive material is to use conductive carbon black.

As the photoreceptor 3 continues to rotate even further, it passes simultaneously by the output paper and the transfer charge roller assembly 46. The transfer charge roller assembly 46 charges right through the output page and attracts the toner, imaged on the photoreceptor, which then sticks by attractive charge to the output page. It is because of the fact that the charge placed on and through the paper is the force that attracts the toner, that thick paper and envelopes sometimes have problems. There is a limit on how thick the output paper can be and still receive a quality charge throughout from top to bottom. Similarly, at this point in the process, the toner is attracted to the

paper like the balloon stuck to the surface of the wall. Again, if one was to turn off the laser printer or copier in the middle of a job, if you look at the output paper in the region just after the paper went through the transfer charge roller assembly 46, the printed image is on the page in dry powdered toner that can be wiped off the page, in the form of the messy black (or other color of the toner) that can get all over your clothes. The output page then goes through the fuser roller assembly (not shown in diagram), a heat and pressure roller assembly that actually melts or fuses the toner to the output page and literally "glues" the toner to the page in the form of the desired image. This glue is the toner itself when it attains a temperature greater than the melting point of the toner. Toner contains mostly styrene and, thus, behaves similar to a hot melt glue.

As the photoreceptor 3 continues to rotate, there is residual toner that never left the photoreceptor 3 due to inefficiency when it transferred to the paper from the charge of the transfer charge roller assembly. Some of this residual toner is in the form of the page-image, a faint ghost of the previous image and the rest of the residual toner still on the photoreceptor 3 is mostly background. In the older toner cartridges such as the SX and CX, a doctor blade was used instead of a spreader blade, and thus, there was a large amount of background toner on the photoreceptor 3 that got scraped into the waste toner hopper 2. Some of this toner, because it was so much toner all the time, wound up getting past the scraping wiper blade 6 that the charging corona assembly and wire attracted this toner when charging, and wound up on the wire, eventually insulating the wire, causing a streak known as the right side streak, or RSS, a messy streak or vertical band on the right side of the output page. For this reason, blade embodiments involving spreader blades 45 are very important, especially for

converting the SX doctor blade 52 into a spreader blade 45. This residual toner is then scraped off the drum using the cutting edge 5 of the wiper blade 6 and toner is then sealed in the waste toner hopper 2 with the recovery blade 4 (shown in figures 1 and 2). Note that in Figure 4, this wiper blade 6 is optionally coated with a conductive coating 117 as in inventor's patent number 5,400,128, or may be loaded with a conductive material, any conductive material, including conductive carbon black, for improved performance..

Then as the photoreceptor 3 continues to rotate, it goes back to the PCR 43 where charging is done and the cycle repeats itself. It should be pointed out that when the PCR 43 charges the photoreceptor 3, it is not only charging the photoreceptor 3, but is also charging over an electrostatic ghost charge of the previous image. Sometimes when the humidity is low in northern climates when the heat is turned on and the air can be very dry, this electrostatic ghost of the previous image is not completely charged over, and a portion of the previous image is faintly printed on the output page. This phenomenon is called ghosting.

Figure 5 shows a toner hopper assembly 47. On this assembly, one can see in greater detail the developer roller 44, the spreader blade 45, and the frame 48 that holds the spreader blade 45. Also on the toner hopper assembly 47 is the reservoir 51 which is literally the tank that holds the fresh toner to provide a continuous supply of toner to the developer roller 44. Typically the spreader blade 45 is urethane rubber and one can clearly see how this spreader blade 45 rubs the toner for the purpose of charging the toner. Inventor owns patent number 5,546,162 used to replace worn spreader blades 45 and to put spreader blades 45 on metal doctor blades or other metal blades in a

conversion process. In the above patent, that invention can be improved with the installation device of at least 3 embodiments of this invention for easier installation and will be shown.

Each blade in the toner cartridge and imaging machine is important. How a blade functions depends on how many cycles of usage the blade has had. For example, recovery blades 4 can kink either from vacuuming toner from the waste toner hopper 2, from wear, from aging, cycling, or even from the process of installation of a new blade. Typically, in the toner remanufacturing industry and in the service technician industry, these blades are replaced on a regular scheduled basis. Some remanufacturers replace these recovery blades 4 every time they remanufacture the toner cartridge just to be safe. Many remanufacturers replace these blades to keep a certain ISO 9000 or other such quality control status. The same is true of spreader blades 45 and wiper blades 6. Wiper blades 6 are always rubbing against the photoreceptor 3 and scraping it. This is a wearing situation. Sometimes a paper impurity or other particle lodges between the cutting edge 5 of the wiper blade 6 and the photoreceptor 3 and eventually scratches the cutting edge 5 of the wiper blade 6. Sometimes the wiper blade 6 can be under-lubricated or over-lubricated. Sometimes the heat of friction from not properly lubricating the wiper blade 6 can cause wear. Wiper blades 6 have a sharp "cutting edge" 5 that contacts the photoreceptor 3 and literally scrapes off the waste toner. From wear, this sharp cutting edge 5 eventually becomes a rounded edge. A rounded edge is not going to scrape toner from the photoreceptor 3 and will cause failure in the form of smudges, smears, leaks and streaks. Another problem of wiper blades 6 is that they can tend to "bend backwards" or "flip" from friction causing heat cycling which causes material weakness in time.

These various wiper blade defects are described in greater detail in inventor's patent number 5,308,515 for a "METHUSELAH" brand drum padding powder sold and manufactured by inventor's company, Laserland, Inc. of Sylvan lake, Michigan which is intended for use on photoreceptors 3, wiper blades 6, spreader blades 45, recovery blades 4 and any other blade involved in the imaging process. Spreader blades 45 tend to wear from repeated use. Because a spreader blade 45 is continually rubbing the toner and generating friction which generates heat, they can sometimes wear quicker than desired.

So, replacement of all blades in the imaging process which includes all imaging machines is critical in obtaining perfection in the imaging industry whether it be remanufacturing toner cartridges or servicing an imaging machine. For service technicians, the CPC (cost per copy) or CPP (cost per page) is critical when obtaining and keeping service contracts. Thus, this invention can be used to keep up the good quality and reduce the CPC and maintain ISO 9000 type standards. If you look at the bend of the spreader blade in Figures 4 and 5, you can see a spring force exerted onto the spreader blade 45 by on the photoreceptor 3.

Figures 6A and 6B shows a prior art recovery blade 4. This recovery blade 4 has a top surface 13 and a bottom surface 10. It has tape or adhesive 11 and a release liner 12 that is peeled away to expose the pressure-sensitive adhesive. Figure 6C shows the first embodiment of this invention, a recovery blade 120 with an extra portion of adhesive liner 118 that sticks out at the easy-pull tab 119 for ease of removal of the release liner 118. This portion of release liner 118 that protrudes has no adhesive on it. This easy-pull recovery blade 120 has a bottom surface 121.

Figures 7A through 7D show another embodiment of this invention, the recovery blade assembly 25, 25A, 25B and 25C. These recovery blade assemblies 25A and 25B have a recovery blade 17A and 17B with a top surface 18A and 18B and a bottom surface 16. They have a pressure-sensitive adhesive/tape 14 with a peelably removable release liner 15. These recovery blade assemblies 25A and 25B also have a stiffener or positioning device 20A and 20B that is removably adhered with adhesive or tape 19. The positioning device or stiffener 20A, 20B and 20C is used to hold the blade rigid so it will not wrinkle, will not adhere where not desired, will adhere where desired and so that the blade will be kept rigid, to set the installation position, to prevent pinching of the blade 25A to 25C, to make the blade easier to grab so an installation tool is not required, to support the blade 25A to 25C, to brace the blade 25A to 25C, to reinforce the blade, to maintain blade width, to act as a blade stabilizer, to act as a blade splint, a support means, installation device, positioning device, and a device to join the blade to its waste toner hopper 2. These positioning device stiffeners 20A and 20B have bottom surface 23 and a top surface 24. The adhesive/tape 19 of the stiffener 20A and 20B has a top surface 22 and a bottom surface 21. The top surface 22 of the adhesive/tape 19 is in surface to surface contact with the bottom surface 23 of the stiffener 20A and 20B with the intention of permanent adhesion. The bottom surface 21 of the adhesive/tape 19A and 19B joins the recovery blade 17A and 17B at its top surface 18A and 18B whereby this surface to surface adhesion is intended to be removable. There exist tapes and adhesives that are permanent-removable whereby one surface is to be permanently adhered and the other surface of the adhesive is intended to be removable. One good example of such an adhesive that is seen commonly in everyday life is the POST-IT (trademark POST-IT available from the Minnesota Mining and Manufacturing Company ("3M") of St. Paul, Minn.) note whereby the adhesive is

permanently adhered to the POST-IT note and removably adhered to whatever the end-user posts it to. This is similar to a type of adhesive 19 that is preferred for adhering the stiffener positioning device 20A through 20C to the recovery blade 17A, 17B and 17, respectively, whereby the adhesive sticks permanently to the bottom surface 23 of the disposable stiffener 20A, 20B or 20C and removably adhered to the top surface 18A and 18B of the recovery blade 17, 17A, 17B, or 17C of this first embodiment. Figure 7B and 7C differ in that Figure 7B has a disposable stiffener 20A that is the same width as the recovery blade 25A while Figure 7C has a disposable stiffener 20B that is wider than the recovery blade 25B for more user-friendly use in certain applications. The disposable stiffener 20B that sticks out and is easier to install and does not require a knife or similar tool to separate the stiffener 25A and the adhesive 19A from the recovery blade 17A. To be even more user-friendly, Figure 7D shows a recovery blade assembly 25C where the adhesive protective release liner 15C has a protrusion with no adhesive for easier removal of the adhesive/2-sided-tape/glue line 15C.

This embodiment of the recovery blade assembly 25 is very easy to install. First peel away the release liner 15 thus exposing the pressure sensitive adhesive 14 that is joining the bottom surface 16 of the recovery blade 17 as in figure 8. Once the release liner 15 is removed, the remainder of the assembly 25 is shown as 26 in Figure 9. After peeling off the release liner 15 as in the figure 8, then hold the recovery blade assembly 26 with two hands as in Figure 9. Then place the recovery blade assembly 26 on the waste toner hopper attach surface 27 on the waste toner hopper 2 as shown in Figure 10. The bottom surface 21 of the adhesive/tape 14 is to attach to join to the attach surface 27 of the waste toner hopper 2. Then this recovery blade assembly 26 is

to be pressed on the waste toner hopper 2 and is to be rubbed, pressed on or burnished. A burnishing tool may be optionally used. I usually just use my fingertips, but for full scale production, a burnishing tool is preferred, a small flat tool with a handle, where the pressure width matches that of the adhesive width on the stiffener 20 or the recovery blade 17. In Figure 11A, the recovery blade assembly 26, already is installed and pressed on and then the positioning device stiffener 20 and the permanent-removable tape/adhesive 19 are started in separation/de-lamination from the recovery blade 17 using a sharp edge such as a blade, knife blade, razor blade, fingernail, thumbnail, piece of metal or other edge. Of course at a greater manufacturing cost this assembly 25 could have been made with stiffener edges that protrude for easy peeling such as that of Figure 7C. Figure 11B shows an easy-pull recovery blade 17D whereby the removable disposable stiffener 20D has an easy-pull protrusion 123 for easy ergonomic removal of the disposable stiffener 20D. Figure 12 shows the removably adhered stiffener 20 being peeled away like a banana peel exposing the top surface 18 of the fully installed recovery blade 17D.

Please note the difference between the recovery blade assembly 25A and 25B. Recovery blade assembly 25A is easier to manufacture because the stiffener 20A is identical in width to the 2-sided-tape/adhesive/glue 19A and can be slit in one easy step simultaneously. The stiffener 20B of assembly 25B, on the other hand, is wider than the 2-sided-tape/adhesive/glue 19B and thus can not be slit in one easy simultaneous step, requires another step and is therefore more expensive to manufacture. However, the recovery blade assembly 25B has a major advantage over the recovery blade assembly 25A. Now, and this is an important feature of this embodiment that because the recovery blade assembly 25B has a wider stiffener 20B

which protrudes beyond the 2-sided-tape/adhesive/glue and beyond the recovery blade 17B, it forms an easy-grab protrusion 113. Thus, when the installer removes the stiffener 20B and tape 2-sided-tape/adhesive/glue 19B from the recovery blade assembly 25B, the preferable pull layer 113 sticks out for easy grabbing for easy removal. As stated, the 2-sided-tape/adhesive/glue 19 prefers to stick permanently to the stiffener 20B and prefers to de-laminate from the recovery blade 17B after a pulling force is exerted upon the stiffener 20B for easy de-lamination removal of the disposable stiffener 20B. The disposable stiffener 20A is removed similarly, but there is not an easy-grab protrusion 113 and thus the recovery blade assembly 25A requires a knife as in Figure 11A and, is not as user-friendly as the recovery blade assembly 25B, but costs less to manufacture.

Please note that in the embodiment of the recovery blade assembly of 25B, although the geometry of the easy grab protrusion 113 sticks out on one particular side, there is no limit to the possibilities of this easy grab protrusion 113. This easy grab protrusion 123 can stick out of one side as shown in Figure 11B, the other side(not shown), both sides(not shown), more to one side than the other side, or any physically possible configuration or combination.

The keeper blade 4 is made of either a thin, stiff plastic or a thin resilient rubber material from three to twenty thousandths of an inch thick. The plastic may be acetate, MYLAR, polycarbonate, polyester, PETG(polyethylene terephthalate, glycol), vinyl, or other stiff plastic. The rubber material may be urethane rubber, neoprene rubber, or other variety of either a rubber or other elastomeric material. Note that there can be any number of no-adhesive/no-tape regions and/or grab protrusions anywhere on the

stiffeners 20A and 20B. The possibilities are limitless and this is an important part of this invention. Note that inventor owns patent number 5,479,250 where the keeper blade 4 is conductive. According to that patent, the keeper blade may either be made of conductive material or otherwise coated with a conductive coating.

Figure 11C is an embodiment of a recovery blade assembly 206 that is one of the best embodiments of this patent application. This important improvement is not only very user-friendly, but is also preferred because it is easy to manufacture in mass production. This ergonomic recovery blade assembly 206 has a left side 212 and a right side 213. This recovery blade assembly 206 has many layers consisting of an adhesive release liner 207, a pressure-sensitive adhesive/2-sided tape/glue 208, the recovery blade 209, an adhesive/2-sided-tape/glue 210 that is intended to stick permanently to the stiffener/support 211 and removably adhered to the recovery blade 209, and a removably adhered support, stiffener, positioning device 211, which may be removably adhered with its glue 210 from the recovery blade 209. An interesting point about this recovery blade assembly 206 is that it is easy to manufacture and very ergonomically easy to install both at the same time. The base materials can be normally laminated adhesive 208, liner 207, recovery blade 209, preferential adhesive 210 and the stiffener/support 211. This lamination and slitting can be performed very simply with sub-steps. The first step would involve lamination of the stiffener/support 211 to the preferential adhesive/2-sided-tape 210 to the recovery blade 209 material. These materials can be triple laminated in wider than the used width for example 10 inch rolls, with the tape 210 in the middle and the stiffener 211 materials on one surface and the recovery blade 209 material on the other surface. Then in the second step, this material can be simply slit to the correct width. Then in the third step, the

adhesive/2-sided-tape 208 with liner 207 can be laminated on to the result from step two, each in proper width. This resultant material may be stored in rolls or may be stored in cartons ready to be cut. In the cutting step, two operations are performed. The length cut is made where the left end 212 of one assembly 206 joins the right end 213 of an adjacent piece to cut to precise length. Also, in the cutting operation, a kiss-cut or double-kiss-cut 220 or other multiple kiss-cuts through the tape 208, liner 207, and recovery blade 209 at location 220 as seen in Figure 7E. Optionally, a fold or crease can be made at location 220 to bend the recovery blade assembly 206 for user-friendly use after or before the kiss-cut at location 220. This forms a handle 214 on the recovery blade assembly 206 where the handle is the region located between the kiss-cut 220 and the right side 213 which may have a crease or fold or the user may fold it before assembly. This handle can be bent or folded on the kiss-cut 220 to form an easy-grip handle that is not only easy to use, but after installation of the recovery blade assembly 206, the installer simply pulls the recovery blade handle 214 and peels off the entire stiffener/support 211 and preferential tape 210 by simply grabbing and pulling the handle 214 and peeling the stiffener 211 and preferential tape 210 like peeling a banana peel. This device totally obsoletes the recovery blade holder tools 9, for example, and eliminates the extra steps involved in using the tool 9. When peeling off the 2 layers 210 and 211, the recovery blade 209 stays attached to the waste toner hopper 2 while the two layers are removed. As the handle 214 is pulled to remove the 2 layers 210 and 211, from the recovery blade assembly 206, the handle 214 stays attached to the disposable remains of the recovery blade assembly 206, in all its layers 215, 216, 217, 218 and 219. This is not only the recovery blade of the future, but is also the blade of the future, because it is so easy to make any blade this way, from a manufacturing point of view. It would have made sense to use the versions of Figure 7B or 7C, however, the embodiment of Figure 7E is not only easier to use, but it is

also easier to manufacture in mass production. The fold or crease at 220 is optional because the installer can be instructed to fold the assembly 206 at the kiss-cut 220 as a part of the installation instructions. Creasing or folding at 220 can be done as a separate step to make the process easier, but there is also another optional way to simplify the crease or fold. If the kiss cut goes deeper than shown in Figure 11C, through the adhesive 210 and partway through the stiffener support 211, then this kiss cut into the stiffener support 211 and will form a natural bend line for folding. Thus, the crease or fold step in the handle 214 at the kiss-cut 220 can be optionally eliminated. This can be important because the folding/creasing operation would require a step additional to the kiss-cut 220 in another operation. It should be pointed out that this inevitable ergonomic, user-friendly embodiment shown in Figure 11C may be used not only for recovery blades and other strip blades, but may also be used to install spreader blades and wiper blades. One important feature of this most ergonomic recovery blade 206 is that the recovery blade 209 may be made of any material, preferably a plastic or rubber, urethane rubber, MYLAR, acetate, PETG(polyethylene terephthalate, glycol), polycarbonate, vinyl or any other material. However, one difficulty exists in the typical case in cutting, slitting and placing adhesive on ultra thin urethanes below .010 inches. The material wants to stretch and deform. Now, and this is an important point that the thin urethane or other elastomer may be simply laminated, slit and otherwise worked with in this embodiment easily, because the stiffener support 211 provides a support to the ultra thin elastomer 209 so that the elastomer can be easily slit in a sandwich of 209, 210, and 211 without concern about stretching the ultra thin elastomer 209 while working with it. Without the stiffener support 211, it would be very difficult to cut narrow strips of very thin elastomeric materials without stretching or otherwise deforming these materials, which would make a wavy recovery blade 209 which would cause a defective waste toner

hopper 2 of a toner cartridge causing the "sprinkle dot streak", a vertical band of dots on an output page caused by a kinked, wavy, or otherwise defective recovery blade 209. Also, this idea, good for installing strips of any kind, may be used in other industries and is a first of a kind, a pioneer patent. This idea may be used for stiffening and supporting any flexible or thin material for any purpose of any industry for easy installation. It could be used in the automotive industry, electronics, construction, camping, carpet industry, or any other industry or use. Of course, the liner 207 and adhesive 208 could be any width whatsoever, including being as wide as the blade 209. There may be applications in some industries where a strip needs to be installed in a precise way or quickly and this device and method could be used to prevent the tape on the strip from crinkling and wrinkling and to give the tape or strip a longitudinal supportive rigidity as tape, whether on a strip or not likes to stick to itself and everything else, and this can provide a simple way to install the tape or strip with greater speed, accuracy, efficiency, reliability, wrinkle-free, with greater ease. This embodiment could be used for installing gaskets, flexible foam material, flexible foam rubber material, die-cut materials and can be designed to fit the contour of any shape to install anything that uses adhesive, 2-sided tape or glue. This device could become another way of packaging strips of any kind for special use requiring greater positioning control.

Figure 13 shows another embodiment of this invention. This is a packaging method, manufacturing method and device for ergonomic re-assembly of a new replacement pickup magnet 8 as a sheet 33 of strips 8. Figure 14 shows the installation of the pickup magnet 8 after installation of the recovery blade 17 is completed. This pickup magnet 8 helps prevent messes from occurring when moving toner cartridges around after the shipping seal is opened. This pickup magnet 8 shown being installed in

Figure 14 also helps keep the recovery blade 17 from de-laminating from the attach surface 27. Inventor has manufactured magnetic strips in single strips, each with its own release liner for over 5 years and manufacturing this has been very tedious, difficult and required great patience. Then, inventor came up with the idea of the pickup magnet sheet assembly 33 shown in Figure 13 where the pickup magnets 8, rather than each magnet 8 individually cut are instead kiss-cut on sheets, each pickup strip 8 on a sheet sharing the same release liner 34. When the die-cutting is performed, the die cuts through the flexible magnetic material 31 and also cuts through the tape/adhesive 30 but does not cut through or cuts through very little of the release liner 34 shared by the entire sheet of pickup magnets. With this innovation 33, manufacturing of the pickup magnets 8 is much less costly and also the pickup magnet sheet assembly 33 is ergonomically more easy for a production person to use. It is easily peel-able, easy to grab, does not require the difficult task of pulling a very narrow and thin release liner for each pickup magnet 8, saves lots of time in installation to the pickup magnet attach surface 28 on the waste toner hopper 2. With this innovation of the pickup magnet sheet assembly, packaging of pickup magnets 8 is much easier and also less costly to manufacture. This pickup magnet is simpler to manufacture than anything in prior art. The sheet of flex-magnet material with laminated adhesive/2-sided tape 30 is die-cut as a kiss cut so as to cut through everything but the release liner 34. After the die cut, since the magnetic strips are very narrow in width, around 1/32 inch as well as thin, the flex magnet material deforms and develops a longitudinal bow for its entire length. The ratio of die blade to material cut (in thickness) is high, and that is what causes the longitudinal bow. The inventor's solution to this longitudinal bow is to run the die cut sheet 33 through a roller, or a pressure-roller, optionally/preferably with heat and the longitudinal bow is gone. After testing and research, it was found that this heat-pressure flattening process is not

detrimental to the material and also is not detrimental to the magnetic field strength. From such a heat-press deformation, in the worst case, magnetic strength could be decreased by around five percent of the original magnetic strength. For this reason, the deformities generated when die-cutting the pickup magnet sheet assembly can be corrected with heat-pressure rolling, flattening out the magnetic material beautifully.

Another embodiment of this invention is another very ergonomic recovery blade assembly 35, shown in Figure 15A and 15B. This blade assembly 35 has infinite possibilities on how it can be made. The diagram in Figure 15A and 15B is just one mere example of this embodiment, although the possibilities are limitless. The recovery blade 40 has an attachment tape/adhesive 41 for attachment to the attach surface 27 and a protective release liner 42 that protects the tape/adhesive 41 prior to use. In a similar way as the procedure of Figures 7A through 7D and Figure 11C, a permanent-removable tape 39 attaches on the removable side to the recovery blade 40 and on the permanent side to the positioning stiffener device 36. The positioning stiffener support device 36 can optionally have flaps of regions with no adhesive for easy and quick removal after installation is done. For example, any number of partial length removal flaps 37 may be installed on either sides as in the figures, or may be installed on the ends (not shown). The partial length remove flap 37 is not required to be in the center, may have any number of flaps 37 located anywhere on the support 36, nor is it required to be symmetrical nor is it required to be as long as 37 in Figure 15B. There is the long remove flap 38 that may even optionally be full length. This long remove flap 38 also has no adhesive at the grab area just like the partial length remove flap 37. Thus after the recovery blade is positioned and installed, the installer may pull on either remove flap 37 or 38 or a similar one in any location to remove the positioning device ergonomically and not requiring using a knife or razor blade as in

Figure 11A. It obviously costs more to manufacture the ergonomic recovery blade 35 than it does to manufacture the recovery blade of Figures 7A through 7C and Figure 11C, and these costs will determine the worthwhileness of this embodiment of this invention. Please note that any positioning stiffener device of this invention whether the simple one 20A through 20D, the easy-grab one 211 or the ergonomic one 36, or any other versions later mentioned in this invention or others similar with the same general idea may be made of any material. However, preferred materials are plastic, metal, cardboard or rubber. Stiff or rigid material is preferred. Of the plastic and rubber materials are, just to name a few, polycarbonate, LEXAN(polycarbonate), PETG(polyethylene terephthalate, glycol), polyester, MYLAR, acetate, vinyl, hard rubber, fiberglass, plexiglass (a trademark product by Rohm and Haas of Philadelphia, PA, made of polymethylmethacrylate), or any other plastic. It should also be pointed out that use of clear material such as clear or semi-clear plastic for the positioning stiffener 36 allows the installer to visibly see and inspect the glue/adhesive line when necessary for more precise positioning by the installer. Also, a glue type containing pigment, dye or other coloring may be used for enhanced view through plastic of the glue line. In some applications this may be important and in others it is not. For such a see-through stiffener, a transparent or semitransparent semipermanent glue/tape/adhesive is desired and such materials are available. Visibility of the glue line is important when converting an SX doctor blade 59 of Figure 16 into a spreader blade 107 shown in Figure 17.

Figure 16 shows a prior art doctor blade 52 of the SX toner hopper 47 (Figure 5). This metal framed electrically charged doctor blade 52 was designed to literally scrape or doctor the toner from over the developer roller 44's surface to control the thickness of the toner on the developer roller 44 and thereby control both the amount of toner used

and the relative page darkness. Figure 17 shows this same doctor blade 52 with a urethane spreader blade 106, thus converting the doctor blade 52 into a spreader blade assembly 107. A method of doing this conversion is shown in inventor's patent no. 5,546,162. Figure 20 shows the spacer 108 located on the bare metal portion of the doctor blade 107 from the patent. The spreader blade 106 is also shown cutaway. The purpose of the spacer 108 was to prevent the metal doctor blade 52 from bowing, warping or curving when tightened down with holding screws (not shown) that go through the holes and the spacer's 108 hole. Although this is all described in inventor's patent number 5,546,162, inventor has found a better way to do the job of inventor's patent without requiring the use of the spacer 108. Before showing the next embodiment that does not require the use of the spacer 108, it should also be pointed out that Figure 18 shows a prior art spreader blade assembly 102 for the LX toner hopper 97. The metal assembly frame 101 is used to structurally support the urethane spreader blade 102. Figure 19 shows the NX spreader assembly 103 with the metal frame 104, and the urethane spreader blade 105.

Figure 21A shows the new and improved installation jig 53 for use in assembly of the spreader blade embodiments of this invention. The doctor blade frame 52 is first placed in the installation jig 53 as depicted in Figure 21B in exploded form. The end holes 58 of the doctor blade 52 are lined up with the jig pins 54 to properly place the doctor blade 52 in the jig 53 for installation of the spreader blade 63 shown cutaway in Figure 22. Figure 23 shows that the jig 53 has end stops 57 for accurate placement of the spreader blade 63 onto the doctor blade 52. The jig also has a step 222 from the jig 53 lower ledge 55 to the jig upper edge 56, so that the surface of the jig upper ledge 56 will be contiguous with the spreader blade bottom surface 224. After the invention that was out in the patent 5,546,162, it has been found that three things are important in proper installation of the spreader blade 63 onto the doctor blade 52. First, Figure 23

shows the accurate placement of the left corner mark 74 of the spreader blade 63 into the left corner mark 73 of the jig 53. Thus the side edge stop 57 of the jig 53 must line up with the edge 115 of the spreader blade 63. Second, it has been also found that the glue line 71 of the spreader blade 63 must also align with the back edge 59 of the doctor blade 52. Third, the right side must similarly align which will be shown in the procedure described for accurate positioning of the spreader blade 63 onto the doctor blade 52. The step by step procedure of this embodiment will be described. Once the doctor blade 52 is placed in the jig 53, as in Figure 21B, then peel the release liner 64 of the spreader blade 63 as shown in Figure 22. Then align the left corner mark 73 of the jig 53 with the left corner mark 74 of the spreader blade 63 and press in one spot only as shown in Figure 23. Press so that the adhesive is only stuck in a small region near the jig left edge stop 57 so that the rest of the spreader blade 63 can be properly positioned using the rest of the procedure being outlined. Next, pull the end of the spreader blade 63 as shown in Figure 24 and stretch if necessary until the hole of the spreader blade 66 fits into the jig pin 54. Then press down on this positioned subsection. Next, without stretching the urethane rubber spreader blade 63, lay down the spreader blade 63 as shown in Figure 25 for about 75 to 80% of the length of the spreader blade 63 as shown in Figure 25. It is important that the glue line 71 of the spreader blade 63 aligns along the back edge 59 of the doctor blade 52. Otherwise, toner powder can migrate under the spreader blade 63 and de-laminate the adhesive/glue/tape 65 under the spreader blade 63. Glue with dye, coloration, or pigment may be used for easier view of the glue line 71. After smoothing down the amount laid down of the spreader blade 63 so far as in figure 25, it is now important to position the right corner mark 72 of the spreader blade 63 with the right corner mark 75 of the jig 53. Then press this portion down up to the right edge 57. Then, Figure 26 shows the pulling of the right end of the spreader blade, and stretching if necessary,

until the hole 66 of the spreader blade 63 fits over and into the jig pin 54. It is important that everything be smoothed down at this point so that the glue/adhesive/tape 65 of the spreader 63 can take hold. After completed, the new modified doctor blade 77 with spreader blade 63 should be pulled out of the jig 53 and is shown 77 in Figure 27. The glue line 67 is along the metal blade back edge 59 as well as is possible for best results. In a spreader blade assembly 77, the glue line 67 position is more important than the position of the spreader blade back edge 81 which is opposite from inventor's patent number 5,546,162. The spreader blade front edge 82 position is not critical as is the glue line 67 position. Also, while patent number 5,546,162 used washers 108 to prevent warpage from tightening down converted spreader blade assembly 107, this spreader blade 63 has longer ends to prevent glue de-lamination with holes 66 in the spreader blade 63 to accommodate the holes 58 in the SX doctor blade 52 so that tightening down the screws to tighten the completed spreader blade assembly 77 will not warp the metal doctor blade 52 which would cause problems.

Another embodiment of how to install the spreader blade 78 using this jig is shown in Figure 28A and 28B. This embodiment involves a simplification of the steps involved in Figures 21B through 26 and achieves the same end result shown in Figure 27, a doctor blade 52 with a spreader blade 63 installed to form a completed spreader blade assembly 77. This embodiment is similar to the recovery blade embodiment shown in Figure 15A through 15D. Both Figures 15A through 15D, 28A and 28B use the same concept for a different result. One is for installation of a recovery blade 40 while the other is for installation of a spreader blade 78. Figures 28A and 28B show a good example of where a removably adhered preferably non-opaque stiffener/positioning support device 79 can help the installer see that the glue line 67 is properly in position.

Glue/adhesive/2-sided-tape 65 with color helps the glue line 67 stand out to make installation easier. To install this version, place the doctor blade 52 in the jig 53 as before. Then remove the release liner 64 of the spreader blade adhesive/glue/2-sided-tape 65. Then grab the removably adhered positioning device 79, optionally using the remove-flap 38 and/or any of the partial length remove flaps 37 to accurately position the spreader blade 78 onto the doctor blade 52. After everything is properly positioned and if the positioning device 79 is either transparent or semitransparent with the adhesive/glue/2-sided-tape 80, then firmly press everything down and burnish, rub, or press it on so that the glue/adhesive/2-sided-tape 65 will hold the spreader blade 78 to the doctor blade 52. When installation is complete, the stiffener/positioning-device 79 may be peeled away like a banana peel with its removable tape 80. The adhesive/glue/2-sided-tape 80 is an adhesive similar to a POST-IT note (trademark POST-IT available from the Minnesota Mining and Manufacturing Company ("3M") of St. Paul, Minn.) which is to stick permanently to the stiffener/positioning device 79 and removably adhered to the spreader blade 78. Thus the adhesive/glue/2-sided-tape 80 has properties where it is removable from the spreader blade 78 and will stay stuck onto the stiffener/positioning-device 79. Thus, the installer, who does not need to be an expert at adhesives simply pulls the positioning device/stiffener 79, and both the stiffening device 79 and adhesive/glue/2-sided-tape 80 peel off with the disposable stiffener/positioning-device 79.

Note that a version of a spreader blade assembly similar to the recovery blade assembly 206 of Figure 11C could be made. Please note that the new and improved shape of the spreader blade 63 of this invention differs from that used in the previous patent 5,546,162 of inventor. By increasing the length of the blade 78, as opposed to that of Figures 17 and 20, a one-piece installation was achieved not requiring washers

108 (Fig 20). However, it has also been learned by hard knocks by inventor that the same result of preventing de-lamination on the ends could have also been achieved by cutting either notches or holes in the spreader blade 63 or 78. Figures 29A-32 show some of the examples on how to prevent de-lamination of the spreader blade 63 or 78 from the doctor blade 52 using notches, zigzags, holes, protruded area, or other shape. One idea is to increase the edge-length of the blade. Optionally, glue may be applied to better hold down the end of the spreader blade 63 or 78. The quickest way to glue is to use a hot melt glue gun.

Figures 28C and 28D show another preferred spreader blade assembly 225, an ergonomic spreader blade assembly. This spreader blade assembly 225 is very easy to install, because there is a positioning support stiffener 230 that keeps the assembly rigid when installing onto a doctor blade frame 52 or other frame. The positioning stiffener support 230 also makes this embodiment easier to install, because instead of the elastomeric spreader blade 63 being pliable, stretchable and exhibiting other properties typical of elastomeric materials, the elastomeric version of the spreader blade 228 is kept supported and rigid and workable (slit-able, cuttable, laminate-able, manageable) when being manufactured (and when installing) resulting in higher product yield, making it easier to manufacture, quicker to manufacture, may be easily slit, may be easily laminated, may be easily produced, all using techniques of continuous flow automation or semi-automation manufacturing processes. This is similar to the recovery blade assembly 206 (Figure 11-C), but instead is a spreader blade, not a recovery blade. This device is not required to be elastomeric, even though most spreader blades are elastomeric, it may be made of any material mentioned anywhere in this patent, for example, MYLAR, polyester, polycarbonate, or any other material whatsoever, although elastomeric blades seem to work best.

The spreader blade assembly 225 consists of a layer of positioning support stiffener device 230, preferential adhesive 229 that adheres better to the positioning support stiffener 230 than to the spreader blade 228, 2-sided-tape/adhesive/glue/transfer-tape 227, a release liner 226 (optional), and also has an easy-grip handle 235 located on the right side 234 of the spreader blade assembly 225. There is a left side 233, two holes 231, and a hole not unlike a square in shape 232, a back kiss-cut region 236 and a front kiss-cut region 242. To the left of the kiss-cut regions 236 and 242 is the spreader blade region 243 of assembly 225. To the right of the kiss-cut regions 236 and 242 is the easy-grip handle 235 on the right side 234 of the assembly 225. The easy-grip handle 235 has an adhesive liner 237, an adhesive layer 238, a spreader blade layer 239, a preferential adhesive layer 240 and a positioning support stiffener layer 241. Note that the stiffener layers 241 and 230 are contiguous and connected in most versions of this embodiment as is the preferential adhesive 240 and 229. This allows for easy peeling of these two layers 229 and 230 when installing the assembly 235. Optionally, the installer can bend the assembly at 236 and 242 area for easy installing the assembly 225 can be installed by having the installer bend the assembly 225 at the kiss-cut region 236 and 242, or the assembly 225 optionally does not need to be bent at all. When manufacturing, a bend or crease can be placed in the kiss-cut region 236, 242. Another option is to kiss-cut in the kiss-cut region 236 and 242, a little deeper, possibly cutting through either the preferential adhesive 229 and 240 and/or the positioning support stiffener 230 and 241, cutting through either/or both either partway or all the way. By cutting part way through the support stiffener 230 and 241, a natural place for an easy fold is generated for easy installation. To install, first remove the adhesive liner 226, thus exposing the adhesive 227. Place the doctor blade 52 onto the jig 53 as in Figure 21B. Then attach the remainder of the assembly 225 on the doctor blade 52, preferably when the doctor blade 52 is located in the assembly jig 53, similar

to the embodiments described using the jig 53. When installing, make certain that the left edge blade 244 and right edge blade 245 of the spreader blade assembly 225 are perfectly flush against the stops 57 of the jig 53. With the stiffener support 230 providing structure to the spreader blade 228, the glue line 71 will be appropriately in place, as will be the left side blade 244 and the right edge blade 245, whereby it should install properly no matter who installs it. The only concern with doing the installation this way is that if the glue 227 is not manufactured straight and proper on the spreader blade 228, then it will be difficult to get the glue line 71 in proper place when installing. By using clear or semi-clear glue/2-sided-tape 229 and clear or semi-clear plastic for support stiffener 230 and optionally a colored adhesive 227, it is easier to verify visually that installation is going right, that the glue line is properly positioned. Then press down the recovery blade assembly 225 or burnish it so that the adhesive/tape/glue/2-sided tape will adhere well. Then grab the handle 235, and peel off the support stiffener 230 and 241 as well as its adhesive 229 and 240. When so doing, all layers 237, 238, 239, 240 and 241 of the handle 235 may stay together without de-laminating them. That is why this embodiment 225 is so simple to manufacture, because it can all stay laminated, but simply kiss-cut. Optionally, the handle can be bent prior to installing. When manufacturing the assembly 225, it may be cut in continuous flow processes because of the simple design.

The Figures 29A through 32 show alternate ways of adhering the spreader blade 63 to the metal frame to be attached. Problems to be overcome are toner migration under the glue causing de-lamination of the spreader blade 63 and other causes of glue de-lamination. Once the glue de-laminates, the spreader blade 63 is destined for failure. A spreader blade 63 of Figure 22 may work for a metal frame 52 designed without a

spreader blade 63 such as the SX toner cartridge, on the verge of becoming obsolete. Other cartridges such as the LX spreader blade assembly 100 of Figure 18 and the NX spreader blade assembly 103 of Figure 19 may not be so forgiving as well as the most popular in 1997 EX spreader blade (not shown). The blade has a limited amount of room to expand beyond the OEM dimensions of Figures 18-19 because there is a felt end-seal that blocks the use of the spreader blade lengthening as the one represented as 63 in Figure 22. The end-felt position physically limits the position of the spreader blade in many types of toner cartridges. Without using the style as the spreader blade 63 of Figure 22, some compromise had to be made over the preferred choice 63. Consequently, an alternate design and method had to be developed and is shown in Figures 29A through 32. These spreader blades 63A through 63F may optionally be enhanced with glue, adhesive hot melt glue added after installation, SuperGlue, conductive SuperGlue, or other enhancement. The styles of Figures 29B and 29C, spreader blades 63B and 63C do not need any enhancement, and so, are more user-friendly to install when enough room is available in the toner hopper..

Figure 29A uses a simple notch 124 cut into the glue area 130 of the spreader blade 63A. Figure 29B shows a simple partial protrusion 125 of the glue area 130 to prevent de-lamination and toner migration under the glue/tape 130 of the spreader blade 63B. This is a preferred embodiment of the figures 29A through 32. Figure 29C uses a full width protrusion 126 that matches the width of the glue 130 width on the spreader blade 63C. Figure 30 shows a spreader blade 63D that has multiple slots or notches 127 on the ends of the spreader blade 63D. Figure 31 shows a spreader blade incorporating multiple triangular notches 128 at the ends of the spreader blade 63E over the glue area 130. Figure 32 shows end-holes 129 located near the ends of the spreader blade 63F that can be filled with glue or adhesive such as a glue gun or hot

melt glue after installation for further support. Thus, a method and device has been developed that is alternate to the spreader blade 63 of Figure 22 that can operate in an environment where there is limited length in which to place the end portions of the blades where additional adhesion can be achieved to avoid de-lamination and toner migration under the spreader blades 63A through 63F.

Figures 33A and 33B show the same concept of the stiffener 86 removably adhered to a wiper blade 83 for positioning the wiper blade 83 to the metal frame structure 84. The principle is the same as that of Figures 28A, 28B, 15A and 15B only this time, the wiper blade 83 is being installed rather than a recovery blade 40 or a spreader blade 78. The Figures 33A and 33B show a disposable stiffener device that is removably adhered to the wiper blade 83 using an adhesive 87 that sticks permanently to the stiffener device 86 and removably adhered to the wiper blade 83. The wiper blade 83, in turn, has a permanent or semipermanent adhesive/tape/2-sided-tape/glue 85 that adheres it to the metal frame structure 84 that holds the wiper blade 83 when in use. This positioning stiffener removable device 86 has optional holders 37 and 38 for easy removal and creases and/or folds for easy removal.

Figure 34 shows the seal assembly 109 of Figures 3C in greater detail. The protective liner 132 of the seal assembly 109 is being removed for installation. A slot 131 or a non-adhesive center 131 is shown where toner will fall through after the tear-guide 89 tears the tear material in a controlled width as shown in Figure 3E. Figure 35 shows one way the seal assembly 109 is installed into the toner hopper 97. Different construction varieties will now be presented.

Figure 36 can be depicted either of two ways in one Figure. In the first approach of

Figure 36, there is a tear material 135 with a tear guide 89 which is adhered to its centerline strip 136 which is a subassembly 137 of a shipping seal 109 of Figure 34. When the tear-subassembly 137 is attached to a seal insert 138 from Figure 38A by removing the adhesive top protective liner 144, thus exposing the top adhesive, the tear guide 89's centerline strip 136 is placed over the slot 139 of the seal insert subassembly 138. The tear-guide 89 guides the tear of the tear material 135 to assure that the tear width will not be narrower than the width of the tear guide 89 at the centerline strip 136 when the tear guide 89 is pulled from its end 142. The tear guide 89 might be a little difficult to tear at the beginning of tear 146 because there is the force of top glue/adhesive/2-sided tape layer 144A below liner 144 adhering to the tear material 135 to the seal insert subassembly 138 trying to de-laminate the tear material 135 from the seal insert subassembly 138 when in fact one wants to tear the tear material 135 down its centerline strip 136, rather than inadvertently de-laminate the tear material 135 from the seal insert subassembly 138 which would certainly result in an unwanted failure because in that event, a much wider amount than the tear-guide 89 width would try to be pulled through a limited size constriction in the toner hopper 97 resulting in a jam, a tear-guide 89 that can not be pulled all the way through, resulting in a failure. Thus, the preferable result would be to tear the tear material 135 along its centerline 136. This problem can occur where the initial tear is made at location 146. One way is to use slits, but another way is to have no adhesive at the beginning of the tear 147 as shown in Figure 38B. When die-cutting the seal-insert 148, the die-cutting process can make a kiss-cut that cuts only through the liner and adhesive 144A and possibly slightly deeper of the shape as shown in region 147 whereby the adhesive can either be removed in these regions 147 and 150 as shown in Figure 38B or the adhesive 144A of the seal-insert 149 can be masked as shown in Figure 38C at regions 151 and 152. Figure 38D shows another way of masking and/or removing the

adhesive 144A from a seal-insert 155 by cutting a "V" pattern or "M" pattern in the adhesive and removing the adhesive at regions 153 and 154 or optionally masking over the adhesive in regions 153 and 154. Other patterns are also possible of either adhesive masking, adhesive removal or lack thereof, but to define every possible configuration and pattern would be a big task and this invention incorporates all shapes and configurations of mask area or adhesive removal area at either or both ends, similar to 147, 151 and 153, noting that this can be done and is a part of this invention. Now, and this is a very important part of this invention because it makes it easier to tear the tear-material 135 at the beginning of the tear 146. When a tearing force by the tear-guide 89 is applied to the beginning of tear 146 region, the tear will be controlled by not only the tear-guide, but also it will be controlled by the lack of adhesive holding the tear-guide 89 and tear-material 135 to the seal-inserts 148, 149 and 155 of the beginning of tear 147, 151 and 153 and thus the beginning of the tear 146 will be controlled by this lack of adhesive at the beginning of the tear. There are two conflicting forces at work here. First, when the tear-guide 89 is pulled, there is a force trying to de-laminate the tear material subassembly 137 right off of the seal-insert 138, 148, 149, or 155. The second force is the tearing of the tear-material 135 along the centerline 136 of the tear-material 135. A third force is the pull trying to remove the seal-insert 138, 148, 149 and 155 from the toner hopper 97 after installation. So which will occur the tear of the tear-material 135 along the centerline 136 or the de-lamination of the tear material subassembly 137 from the seal-insert 138, 148, 149 or 155? The applied forces will try to do both operations at the same time when the initial pull is made on the tear-guide 89. In the seal-insert 138 of Figure 38A, it can tear some and de-laminate some and thus a failure will occur sometimes but it usually will work alright but will occasionally fail. This occasional failure is not good enough in an industry that demands perfection. So, by either removing or

masking off some of the adhesive/2-sided tape/glue 144A at the beginning of the tear, you have thus, if properly done, favored the tear-material 135 to be torn rather than cause a failure by de-laminating the seal tear subassembly 137 or any unwanted portion thereof. You have now control over the initial tear 146 to prevent de-lamination of the tear material subassembly 137 from the toner hopper slot opening 159 in the toner hopper 97 and can prevent this type of failure.

In the second approach to Figure 36, the centerline 136 of the tear material subassembly 137 has longitudinal kiss-cuts 136 that control the tear rather than a tear guide. In this view, the tear pull strip 89 is contiguous with the tear material subassembly 137 and not a separate material as in the previous paragraph, and made of the same tear material 135. But all the principles of the above paragraph apply the same way with the only difference being that the tear pull-strip 89, being contiguous with and made of the same material as the tear material subassembly 137, therefore does not have a hump at the longitudinal centerline caused by the thickness of the tear-guide 89 glued to the tear material 135 as in the previous embodiment. This bump can cause leaks at the beginning of the tear region and the end of the tear region. To compensate for this, a thick adhesive with gooey properties that can fill the grooves must be used as in the previous embodiment. With this embodiment, there is no such bump and special glues/adhesives are not required to fill in where the kiss-cut region 147b, 151b or 153b is at. If the kiss-cut touches the adhesive 144A, then it may require special glue or adhesive, but if the smooth surface touches the adhesive layer 144A, then there is no place for the toner to leak and the kiss-cuts of the centerline 136 control the tear and also help control the initial tear to tear rather than de-laminate the tear material subassembly 137. Please note that when I refer to a kiss-cut, I am referring to a precision cut that cuts part way through the tear material 135 in the tear

material subassembly 137 whereby the tear-guide 89 is contiguous with the tear-material 135 and the tear-subassembly 137, is all one piece. There exist some materials that tear straight and tear nearly straight anyway. But the kiss-cut can help aid these materials or many other materials as well to tear straight without requiring the use of a tear-guide 89 that is not contiguous with the tear material 135.

Figure 37 shows yet a third approach to do the same as in the last two paragraphs but this time the tear material subassembly 1153 has no tear guide and has no kiss cut. The tear material 135 here is made of a material that tears straight or nearly straight such as a polypropylene, not excluding other materials, with a linear stretch to it that causes the material to tear straight or nearly straight. Thus, the tear-guide 89 is not required and cost is reduced. Use of such polypropylenes has been done before and is admitted prior art from the Honda patent number 5,177,540. But what is unique here is using the device and methods of figures 38B through 38D in conjunction with Figure 37 to control the initial tear to be a tear rather than to be a de-lamination of the entire tear subassembly 1153. Figure 37 consists of a tear subassembly 1153 that uses a contiguous tear-pull-strip 89A to pull on material identical to that of the tear subassembly 1153. Note that this initial tear-control method and device also makes the initial tear easier to do requiring less force to pull. The concept of reduced tearing force has been discussed in the 5,523,828 reference using little cuts at the beginning of the tear, an aperture of the seal-insert 138 at the tear region, but did not disclose adhesive masking, a lack of adhesive, or kiss cut 147b, 151b and 153b at initial-tear-regions such as 147, 151 and 153. Parent application 6,552,780 to this application also discloses pre-cuts as a way of initiating the tear of a tear-seal. Additionally, parent patent 6,532,780 discloses cuts at the end of a tear of a tear-seal. Initial-tear-region 147 uses a lack of adhesive 147c to cause the seal to tear in the initial-tear-region 147.

Initial-tear-region 151 uses a masking of the adhesive with a portion of release liner 151c kiss-cut at 151b to separate the release liner 151c from the release liner 144 in the cutting step without requiring an additional step. Initial-tear-region 153 uses a masking of the adhesive with a portion of release liner 153c kiss-cut at 153b to separate the release liner 153c from the release liner 144 in the cutting step without requiring an additional step.

My invention optionally uses a masked area or lack of adhesive area also at the end-of-the-tear-regions 150, 152 and 154 as well. End-of-the-tear-region 150 uses a lack of adhesive 150c to cause the seal to tear in the end-of-the-tear-region 150. End-of-the-tear-region 152 uses a masking of the adhesive with a portion of release liner 152c kiss-cut at 152b to separate the release liner 152c from the release liner 144 in the cutting step without requiring an additional step. The nice thing about masked areas 151 and 153 is that by kiss-cutting 151b and 153b, or not cutting all the way through all layers, when assembling, the liner 144 will peel off leaving liner 151c, 153c, 152c and 154c on the seal-inserts 149 and 155, and thus, one labor step is reduced with this improvement. Inventor used to have material masked on a production line requiring an assembler to hand-place a piece of the tear-guide 89 in a region similar to 151 to mask it. It varied in dimension too much, and consistency was desired since location of masked material varied so often, only by machine-made maskings such as 151 and machine made kiss-cuts 151b can consistency be achieved. With a die-cut controlling the dimensions of the mask 151 and 152 of the invention, every masked area is identical and optionally, the adhesive liner may be used as the mask, reducing the labor required, because this way, the laborer leaves the little piece of adhesive liner 151c and 152c, 153c and 154c on the seal-insert 149 and 155 without guessing where to place the tiny piece of adhesive masking material. Also, it should be

pointed out that hand-masking by guessing or "eyeballing" has been done in production by inventor since 1994, it should be disclosed, but controlled or precision-masking is a recent invention, not yet shown to the public.

It should be pointed out that in Figures 38A through 38D, in all embodiments contained herein, the layers 143, 144 and 145 can be depicted differently. This patent has plenty of drawings, and in order to minimize the number of drawings, these versions will be depicted by Figures 38A through 38D, rather than repeating these drawings twice or more times. This applies to all embodiments that use Figures 38A through 38D contained herein. In one view of these figures, 143 is plastic or cardboard while 144 and 145A can be either glue, adhesive or two-sided tape. In another outlook, all 3 layers can represent a two sided tape or a transfer tape where 143 represents the center portion of the tape or carrier while 144 and 145B are the adhesive. In another view, 143 can be the glue/adhesive/2-sided tape while 144 and 145 can be the protective liner of the adhesive. All possibilities of the above are to be incorporated in this description throughout as possible configurations of seal inserts 138, 148, 149 and 155. There are infinite possibilities.

A Typical Die-Cutting Process: The adhesive masking may be further improved upon by using the very release liner, an ingredient of some adhesive tapes, that is already on the tape to mask the adhesive at the initial tearing and/or final tearing area, or any other location where the magnitude of the pulling force is to be reduced. This adhesive masking using the release liner can be even further improved by forming precise adhesive masking during the same die-cutting process when a component of the seal assembly is formed, and thus does not require an extra step, but rather uses a die that does both functions of cutting a component and kiss-cut-forming an adhesive mask, all

in one die-cut step. Thus, labor is saved. These seal assembly improvements may be implemented in the overall manufacture of a toner hopper, toner cartridge and/or an image forming apparatus.

Figure 38E shows one type of a die 500, as an example only, to show a simple example of how a die-cutting process is done, as other types of dies, equipment such as that on a cylinder of the rotary type may also be used to perform the processes of this patent. The die 500 has, in this example, blades 501 to cut an outer perimeter of a seal-insert, 149, blades 502 to cut an open central portion of the seal-insert, and blades 151A and 152A to separate a masking region 151 and 152 from a non-masking region of a seal-insert 149. The depth of cut of blades 151A and 152A are not as deep as the depth of the cuts of blades 501 and 502 which cut all the way through the material, thus blades 151a and 152a cut at a shallower depth in what is called a kiss-cut, and therefor does not cut all the way through all layers but must cut fully through the release liner layer 144 or the release layer 144. Blades 151A and 152A may also cut into the adherent layer 144a or the tape/adhesive/two-faced tape/glue layer 144a, in the process, which would have no effect, but must cut fully through the release liner layer 144. Blade depths are not to scale and are exaggerated in the Figures to visually show that there is a difference in depth of cut.

Figure 38F shows just prior to the die-cut process the die 500 and the material to be cut. The material 560 has a region 520 showing lines inside where the cuts will be made and a region 510 outside where the cuts will be made. A material 540 is shown under the material to be cut 560, which provides support to the material to be cut 560 in this example. Figure 38G shows where the die blades 501, 502, 151A and 152A are cutting into the material 560. Figure 38H shows the seal-insert 149 being removed

from the material 560, leaving some material 560 that will be discarded. Figure 38K shows the seal-insert after separation from the material 560, leaving an opening 530 in the material 560 to be discarded. Figures 38 I and 38J show the seal-insert 149. Figures 38L and 38M show the middles 550A and 550B of the seal-insert 149a and 149 being removed to create an open central region 551 or opening 551 of the seal-insert 149. In the case of Figure 38L, a bottom release liner 145 remains in its original position after the cut process and is not removed with the middle where in the case of Figure 38M, the bottom release liner 145 is cut all the way through and is removed with the middle. Figure 38N shows a seal-insert 149 with an open central region and Figure 38o shows the non-masking portion of the release liner 144 being removed, so that the masking portions of the release liner 151c and 152c remain on the seal-insert 149. Figures 38P and 38Q show how different blade depths or blade levels can be used to form the cuts of Figures 38L and 38M. The blades are 152A for a shallow cut through the upper release liner 144 and blade 502 making a deeper cut to the bottom release liner 145, but not cutting all the way through the bottom release liner 145. Figures 38R and 38S show the tear-able material 137 and 1153 being installed on the seal-inserts, adhering to the adhesive 144A and not to the masking release liner 151c and 152c, Figure 38R shows a tear-able material 137 with a main body portion and a pull-strip where the pull-strip is a tear-guide 88. Figure 38S shows a tear-able material 1153 with a main body portion and a pull-strip 89A where the pull-strip 89A is not a tear-guide 88.

In patent number 5,523,828, a seal assembly is discussed that reduces the tearing force required to pull a tear subassembly such as that described as 1153 combined with perimeter adhesive. This patent uses slits(cuttings), foam, an aperture, rows of holes, an opening, two cuts at the beginning of the tear, a support under the pre-tear, which

may be at either or both ends. In this present patent application, not only is the tearing force lowered as described by patent number 5,523,828, but also, the tear is controlled and de-lamination of the tearing subassemblies 137 and 1153 is prevented by using the device and methods described above. It should also be pointed out that this inventor's patent number Re. 35,529 shows the first positioning stiffener device and dates back to January 1993 while patent number 5,523,828 disclosed a stiffener in September 1994, around one year and eight months later.

It should be pointed out that the embodiments of Figures 38A to 38D may be expanded for use in the seal of patent number 5,523,828. A seal assembly has been made that has a stiffener device similar to that of patent number 5,523,828 that uses the embodiments of Figures 38A to 38D to control the initial tear of the tear-material. Although this invention has been described, one embodiment is to make the seal assembly of that other patent but instead use the removal of adhesive at the tear opening 147 and 153 to control the initial seal tear, and also can use the kiss cut of the adhesive liner 151c or otherwise mask an entry portion of the adhesive in order to control the seal's initial tear. This may be done with a 2-sided tape, transfer tape, glue, adhesive, foam tape, plastic gasket with either 2-sided tape or glue on any or all surfaces, cloth tape, paper tape, foam tape, plastic tape, polyester tape, acrylic tape, rubber cement, rubber based adhesive, hot melt adhesive, hot melt pressure-sensitive adhesive, pressure sensitive adhesive, wood glue, ~~TIGHTBOND CEMENT~~ Titebond Wood Glue (by Franklin International, of Columbus, Ohio, trademarked as Titebond Wood Glue, a product line of glues), plastic wood, caulk, latex based adhesive, silicone based adhesive, resin glue, superglue, LIQUID STEEL (brand adhesive by PERMATEX company in Hartford, Connecticut, a very aggressive adhesive, part number 25909), army surplus glue, or any other adhesive or tape material in existence

and by default any tape or adhesive material that did not yet exist at the time of this writing.

Please note that seals as in many of the figures have an inherent problem that might not seem obvious at first glance. For example, going back to Figure 3C, where the tears are shown, particularly the tear labeled 92, it can occur that when pulling on the tear-guide 89, when both tears labeled 92 are supposed to continue tearing after pulling, there can be occasions when, rather than both tears 92 tearing, either 92A and/or 92B may instead de-laminate, peel off of the seal-insert of the seal assembly 109. When this occurs, a failure of the entire toner cartridge takes place which is very costly to the end-user who needs a toner cartridge, is costly to the retailer who sold the toner cartridge, and even more costly to the toner cartridge remanufacturer who has to pay all costs incurred and for the cost of the shipping of a failed toner cartridge as well as a replacement "no cost" toner cartridge to make up for the failed toner cartridge. Not mentioning an unhappy if not lost customer, this type of failure can be very costly. Inventor has a solution. First the solutions mentioned in embodiments of Figures 38A through 38D show a solution to this type of problem. However, that described solution would not be complete if not for a process that can be done on the seal-assembly 109, which is also applicable to other seal assemblies. It consists of using a press, a hydraulic press, motorized press, flywheel press, punch press, clicker press, clamshell press, arbor press, hammer press, hammer, or any other device that exerts a pressure. For example, an arbor press may be used to exert a pressure on the ends 92A and 92B as well as the middle between the slits 92 and 92 shown in Figure 3C. This may be done with or without the slits. For example, the press may be pressed on all regions, 92, 92, 92A and 92 B all at once, or may press each region individually. Press may be machined on the hammer pressure area to be indented to fit the contour,

optionally. The press's hammer or pressure rod may have different smoothness for a different effect. For example, the hammer head may be perfectly smooth for a good pressure to cause adhesive to adhere. Press may be rough with bumps. It may have little pyramidical points or bumps, octahedrons, half octahedrons, spikes, nails, removable nails, removable spikes, knurls, single knurl, double knurl perpendicular to each other, lines, sharp lines, points, or other shape. The purpose of the pointed and other shapes is to stick into the adhesive and plastic of the seal-insert in order that the tear material 93 (Figure 3C) will not de-laminate or peel off of the seal-insert 138 (Figure 38A). In some applications, pressing on the end of the seal assembly 109 on the ends 92, 92A, 92B, with a coarse or rough material that "digs" into the material will accomplish a more permanent adhesion than otherwise, almost like "crimping" the tear material 93 into the seal-insert 138. The adhesive can ooze into the little pores or scores from the pressing action. This pressing action will essentially "crimp" the tear-material 93 into the seal-insert 138 for long-lasting, if not permanent bonding. It should be pointed out that since 1994, inventor has used the pressing procedure on seal assemblies as in Figure 3C with seal-inserts as in Figure 38A, on a regular, commercial production basis for resale seal assemblies 109. The same is true of neutralizing the adhesive with a small strip under the initial tear. However, inventor has just begun using the press and neutralization together without the slit. Recently, inventor was confronted with a patent of a competitor who has a patent on the slit, and inventor had to develop a way of making this seal without the slits 92. Inventor found that using the embodiments of Figures 38B, 38C, and 38D, in combination with using the press along the edges and middle of the initial tear, caused a controlled tear, a tear that never fails, a tear that is identical all the time, without requiring an initial tear. Thus, when the end-user pulls the seal assembly similar to 109, or other seal assembly, but any seal assembly that does not have cuts 92, that the initial tear is

totally controlled and easier to tear than otherwise, and thus, failure in the field is prevented. Although inventor has used tears with a press previously and has used adhesive masking underneath the initial tear previously, inventor had not previously used this technique without the tear, a novel and new way of controlling the way the initial tear takes place. Inventor has only recently made this discovery and it was not obvious from prior art. In prior art, the pre-tears 92 were required, and the press on the ends and the middle were just to insure that the material did not de-laminate. The precuts 92 controlled the tear, not the masking and pressing. However, it was recently found that the labor of performing the precut 92 has been eliminated with this innovation and the initial tear is controlled even better than previously with either of these innovations as well as both innovations combined, that is, the pressing and the adhesive masking. To further improve the device and process, inventor also recently developed the die-cutting where the adhesive will be either masked or removed as shown in Figures 38B through 38 D, already described, and also incorporating the pressing of the ends 92, 92, 92A and 92B without making cuttings shown at 92. It should be pointed out that this press technique, adhesive masking, controlled kiss-cut die-cut adhesive masking or removing may be used on any seal device of this patent, any prior art in this patent, any seal assembly that tears in existence, and for any seal assembly that tears that does not yet exist.

Figure 39 shows a simple seal assembly 109 with a tear-guide 89 and a slot 139. This seal assembly has been improved in Figure 40 by having the liner 154 on the seal have an easy-pull region 155 of liner with no adhesive that is easy to grab.

Figure 41 shows a toner hopper assembly with a sidewall seal installed in it. A prior art sidewall seal assembly 165A is shown in Figure 48 from patent number 5,621,508.

The sidewall seal has a base attach portion 174A and a sidewall attach portion 173A which attaches to the sidewall 158. The sidewall seal assembly 165A attaches to the base of the toner hopper 97 covering the slot opening 159. When the tear-guide 89 is pulled, the tear-guide controls the opening in the seal. Figure 41 shows a sidewall seal 167 installed in a toner hopper 97. When the tear-guide is torn, the sidewall seal opens up a channel for toner to fall through. Figure 42 and 43 shows a sidewall seal assembly 165 being prepared for installation. As can be seen, the installer must first remove the protective adhesive liner 171 to expose the adhesive 170 for use. But as can be seen, there is a positioning support device (brace) 166 that stiffens the seal to be manageable while installing in the toner hopper 97. Once the sidewall seal assembly of this invention 165 is installed, the disposable positioning brace 166 is then removed. This provides an easy installable method and device for installing the very difficult sidewall seal 167 in its location. Previously, the sidewall seal 167 was installed as shown in Figures 44 and 45 by inventor where the liner is not removed until after the sidewall seal is put in position. This is a very tedious process and therefore, the invention significantly improves upon the old method and device. Figure 46 shows yet another improvement of the sidewall seal assembly 165. An easy-pull liner 202 is shown for easy removal of the liner 171 of the sidewall seal assembly 165. Figure 47 shows the cutaway of a toner hopper 97 with a sidewall seal 167 installed in the toner hopper 97. The back-wall portion 173 attaches to the back-wall 158 of the toner hopper 97 while the base 174 of the sidewall seal 167 fits over the base of the toner hopper 97 so that the sidewall seal 167 covers the slot or opening 159 of the toner hopper 97.

Inventor owns patent number 5,296,902 that discloses a seal-insert with a tape or heat-tape that removes from the covering of a slot. Figure 49 shows another embodiment of

a sidewall seal. This seal assembly 203 has a sidewall seal-insert 176 with a slot 177 where toner falls through. The seal portion 175 may be either attached with heat tape or regular tape/adhesive/2-sided-tape, fitting nicely over the slot 177. It must be larger than the slot 177 in order to both cover the slot and also to adhere to some of the surface of the base 204 of the seal-insert 176. Thus after this seal insert 176 is installed by the toner cartridge remanufacturer, the end-user who receives the toner cartridge pulls on the seal 175, be it tape/adhesive/2-sided-tape or heat-tape, and the seal 175 de-laminates from the seal-insert 176 for an easy-pull seal. Of course this seal assembly 203 or the seal assembly 165 of Figures 42 may be installed with a more sophisticated positioning tab brace device 181 as shown in Figure 50. The brace 179 has a brace base 182, a brace sidewall 181, and all the options already described for removable braces in this patent. Partial length tabs 180 are optional as well as a full length tab 183 for ergonomic removal of the brace/sidewall seal assembly 178 and easy installation of the seal-insert 167. The release liner 171 of the sidewall seal-insert 167 is also shown in Figure 50.

Figure 51 shows a prior art perimeter seal 184 of patent number 5,080,745. The seal 184 consists of a strip of flexible film with a pull end 185 and a perimeter adhesive 186 located typically in a rectangle with no adhesive in the center region 187 of the rectangle. If you look at the patent, it shows a very difficult procedure of installation that involves a little bit of origami, a little bit of skill, and a lot of luck. This process patent 5,080,745 shows not only a lot of folding and an insertion tool involved in the installation process, but it also involves a lot of maneuvering to make certain that you are grabbing the correct arm of the strip. This seal, in its prime, was the best seal on the market, as it is credited as being an early OEM lookalike seal in the aftermarket that fits directly over the opening 133 in the toner hopper 89. It is still a good seal.

Only now, this seal may be installed even easier using the positioning brace 190 with its removable adhesive 189 adhering it permanently to the brace 190 and removably to the seal assembly 184 of Figure 52. Also, it has been further improved by adding a protective liner protrusion 188 on the liner 191 whereby the liner has no adhesive over this protrusion. All the same features of a seal assembly using the stiffener positioning device 190 are shown in Figure 52. The partial length tabs 37 are shown, the full length tab 38 is shown, and these integral tabs can be located on any edge of the positioning device 190. This drawing of this perimeter seal 184 is the most ergonomic way to make this seal at this time. Perhaps the perimeter seal could have a comeback. However, even though this is a perimeter seal 184 in the drawing, it should be noted that the perimeter adhesive could cover the entire attach rectangle of the nonadhesive region 187 inside the perimeter adhesive, for the simplest design to manufacture.

Figure 53 through 57 relate to patent number 5,296,902 by the inventor. This patent involves a seal-insert 192 with a slot 193 in the center, a back leg of the seal-insert 192, a front leg 195, and a seal 196. This seal assembly 205 is a simpler version of the seal assembly 203 of Figure 49, only does not have the sidewall. The seal 196 covers a slot 193 in the seal-insert 192 and is thus, wider than the slot. The seal may be either a tape/adhesive/2-sided-tape seal or a heat-seal whereby heat is applied to attach the seal to the seal-insert 192, which may be conveniently done by the manufacturer at the seal factory. This embodiment may have all the features of Figures 15A, 15B, 27, 28A, 28B or 52 for user-friendly installation. The positioning installation brace, just like all the other positioning installation braces may be made out of plastic, metal, cardboard, hard rubber, or any stiff material, but is shown in the figure 55B.

Figures 58-60 show embodiments improving the Prestel seal of patent number

5,110,646. Figures 58 and 59 were taken out of the Prestel patent to show the cumbersomeness of the installation of this seal. If you have ever held a 9 inch piece of loose tape, and experienced how it sticks all over the place, you can imagine how difficult it is to use the seal of that patent, as described. After practice, it gets easier, however, by using the invention of Figure 60, the Prestel seal becomes much easier to install. By merely adding a positioning brace 200 to the seal assembly 198, using a tape that is designed to stick permanently to the brace 200 but adhere removably to the seal 198, installation of a rigid Prestel seal becomes easy and simple. The stiffener device 200 may optionally have partial length tabs 37, full length tabs 38, folds or creases 76 and may be positioned in any configuration imaginable on the seal 198.

Figure 61 shows an ergonomic seal-assembly 247 similar to the recovery blade assembly 206 of Figure 11C. It consists of a tear subassembly 248 and a seal-insert 249. In one embodiment the seal-insert 249 may consist of a 2-sided-tape/glue/adhesive/(plastic with tape or glue on each side) 265 with a release liner 264 on top and a release liner 266 on the bottom. Optionally, for easy hand-assembly/manufacturing of the assembly 247, the bottom release liner 266 is made of a rigid material such as a cardboard or cardboard like release liner 266. Rigid release liners such as cardboard or plastic may be found in the automotive adhesive supply industry in varying degrees of thickness and rigidity, so multiple choices exist of adhesives with heavy duty release liner. The reason that a rigid release liner 266 could be appropriate here is because it would facilitate hand assembly of the seal-insert 249 to the tear subassembly 248, and this is an important part of the embodiment. Not everyone knows of these heavy duty release liners. Note that although the top release liner 264 is shown on top of the seal-insert 249 in Figure 61, in a breakdown of the seal assembly 247 embodiment, in practice, this top release liner 264 would be

removed from the seal-insert 249 before being assembled with the tear subassembly 248 to make the seal assembly 247. The seal-insert 249 has a slot 263, a left side 262, and a right side 261. The tear subassembly 248 is composed of three basic layers, the positioning support stiffener 250, the preferential adhesive 251, that is designed to stick permanently to the support stiffener 250 and removably adhered to the preferential tear material 252. The tear subassembly has a left side 260 and a right side 259. The narrower right side 259 of the tear subassembly 248 is called the tail 255. The tail has three layers, the stiffener layer 256, the preferential adhesive layer 257 and the tear material layer 258. The tear subassembly 248 has a back kiss-cut region 253 and a front kiss-cut region 254, where the positioning stiffener 250 and preferential adhesive 251 have been cut through. Thus, the preferential tear-material 252, has either not been cut through or has been barely cut through, enabling the removal of the entire tail 255, beginning at 250A and 251A to be removed. Then the seal assembly 247 may be installed by removing the entire release liner 266 to be attached to a toner hopper. Then, the installer may grab the tear material 252 at position 252A and then also grab the installation support stiffener 250 to easily and precisely install the seal assembly 247 into a toner hopper 97. The installer may then remove the entire positioning stiffener 250 and preferential adhesive 251. In the typical case, a fold, crease, indentation, or slight cut may be made at the region between the back kiss-cut 253 and the front kiss-cut 254. Thus the user may remove what remains of the positioning stiffener 250 and preferential adhesive 251 after installing the entire seal assembly 247 into a toner hopper. As with the other embodiments of Figure 28C and 28D, the kiss-cut regions 253 and 254 may be multiple kiss-cuts or may be one kiss-cut, although Figure 61 shows it as multiple kiss-cuts. The result after installation is flexible material 252 adhered with a gasket-shaped glue/2-sided-tape holding the flexible material 252 onto the toner hopper 97.

Note that any blade improvement contained in this patent application may be a recovery blade, keeper blade, wiper blade, doctor blade, plastic doctoring blade, spreader blade, or any other blade used in a toner cartridge, or other Xerographic imaging machine. Furthermore, any positioning device/brace/support member/splint/stabilizer/installation support/setting device/reinforcing member/spine in any embodiment of this patent application may be made of any material whatsoever, not to exclude plastic, cardboard, paper, metal, rubber, foam, foam-rubber, open-cell, closed-cell material, urethane rubber, plastic with metal plate, plastic with metal coated surface, plastic with aluminum film, antistatic plastic, antistatic material, non-antistatic material, single layer material, double layer material, multiple layer material, composite material, vinyl, polycarbonate, PETG(polyethylene terephthalate, glycol), acetate, MYLAR, fibrous material, fiber reinforced material, stranded material, cloth material, polyethylene, polyester, TEFLON (TEFLON is a trademark name for a resin sold by E.I. duPont de Nemoirs and company made of TFE or tetrafluoroethylene resin which may be made into PTFE or polytetrafluoroethylene), ~~DELRON~~ DELRIN (DELRIN is a trademark name for an acetal resin sold by E.I. duPont de Nemoirs and company, and is also the name used for material made with the acetal resin), polypropylene, extruded material, rolled material, heat-rolled material, wood, cross-grained material, molded material, any paper product, any paper derivative product, any plastic derivative product, magnetic material, nonmagnetic material, notched material, baked material, heat-treated material, laminate, FORMICA (Formica is a trademark of the company Formica Corp., formerly of Wayne, NJ, now of now of Cincinnati, OH. Formica is a trademark for a brand name of their products which are high pressure laminates of resins which may include paper.), spring material, spring-steel, spring brass, spring bronze, conductive material, nonconductive material, pressed material, die-cut material, cross-linked material, stressed material, non-

stressed material, coated material, conductive coated material, brace material, material with two smooth surfaces, material with one smooth and one rough surface, material with two rough surfaces, material with one or more surface of a matte finish, clear material, opaque material, radioactive material, non-radioactive material, reflective material, nonreflective material, heat or light reflective material, antistatic material, or any material whatsoever.

Please note that any urethane for any blade in this invention may be made of conductive coated urethane, partially conductive coated urethane, loaded with conductive material to be conductive in the manufacturing of the urethane, or may be made conductive using conductive carbon black. One way to add the conductive component to make conductive urethane of varying resistivities/conductivities is to load the urethane in manufacturing with a conductive carbon black filler. It is like pigmenting color only instead of regular black it is conductive carbon black. Compounded in a 50% loading of black in color concentrate. The maximum load is around 10% to 12% conductive carbon black, although the loading varies with material thickness. With a 20 mil urethane, 10-12% loading is maximum load. With thinner material it is less because the thinner the urethane, the more difficult it is to load. Before extruding, the urethane is in the form of conductive pellets. There are many applications of blades in toner cartridges and imaging machines, some not mentioned here, where conductive blades may be desired. There are antistatic reasons, charging reasons, and other reasons, but any conductive or partially conductive blade in a toner cartridge or imaging machine may be incorporated into this invention using any of the embodiments.

Materials that may be installed with stiffener/support/brace/positioning device include

any plastic, cardboard, stiff paper, paper, flexible material, film, metal, metallized plastic, paper, paper products, paper derivatives, foam-like material, foam, foam rubber, rubber, hard rubber, open cell material, closed-cell material, urethane, urethane rubber, neoprene rubber, silicone rubber, cloth, or any other material. The embodiments of this invention may be used to install any devices or strips, plastic, cardboard, paper, any material with slots, any material with openings, gaskets, horseshoe shaped material, u-shape material, v-shape material, w-shape material, or any material or device of any shape.

Please note that any embodiment contained in this patent application may be incorporated into any other embodiment and if any such details may be inadvertently left out, it can be thus incorporated into any embodiment. Also, there are many other versions of seals and strips that could use the improvements of this invention that were not mentioned specifically by name or defined specifically, and the inventor wants to reserve his right to incorporate the embodiments of this invention further into any similar device or structure to the uses described in detail in this patent application.

It should be pointed out that in Figure 61, the kiss-cut is made at regions 253 and 254, also shown in Figure 62, which is the same as Figure 61, however, with an improvement at the right side 259 of the seal assembly 247 area. However, the kiss-cuts 253 and 254 can be as many as desired without limit, and there can be specific reasons to make the kiss-cuts in other places as well. For example, a kiss-cut is made toward the right side 259 of the tear-subassembly of the seal-assembly 247. By having such a kiss-cut toward the right side 259, a pull-handle 267 can be integrated into the design of the seal assembly 247. This is similar to the ergonomic recovery blade assembly 206 of Figure 11C which also has a handle 214 integrated into the design.

Just by making a kiss-cut, a handle is made where the adhesive 271 of the handle 267 is covered with a stiffener 270 so that the handle 267, when pulled by the end-user , will not be sticky from the adhesive 271. Yet at the same time, the handle 267, if only comprised of the handle flexible tear material 272 integral with the preferential tear-able material 252 to tear preferably uni-directionally, whereby this handle 267, without the stiffener 270, would be difficult to grip and difficult to grab, and would curl around in random direction every which way. With the stiffener 270 it has the built-in handle 267 that does not have to be added, but can be simply kiss-cut into the existing design while manufacturing with no additional labor required. Figures 64a and 64b show how one remanufacturing company has placed a stiff and flat thread-through guide 275 on the end 274 of a tail 273 of a generic seal assembly. The flat and stiff thread-through guide 275 is a simple piece of plastic 275A located at the end 274 of a tail 273. Although the plastic has no limit in thickness, it should be in the typical case between .005" and .050" , however, for convenience I use .010" LEXAN (polycarbonate) polycarbonate plastic which I buy in rolls for continuous flow operation. The guide 275 has a right side 276 and a left side 277, an attach area 279 (not shown) and an adhesive 278 at this attach area 279 (not shown) where the thread-through guide 275 is placed through the channel 268 of an LX toner hopper 97 as shown in Figure 3E. The prior art guide 275 only touched a portion of the tail 273 at the attach area 279 (not shown). The attach area 279 (not shown) is located between the release liner layer 278a and the adhesive 278. However, the handle 267 of this invention is already an integral part of the stiffener 256 attached to the seal assembly 247, but merely has a kiss-cut for easy manufacture. Also, the pull handle 267 may be made of any stiff material, but by the nature of this design, it must be made of the material that the three major layers of the seal-assembly 247 is made of. The stiffener 270 of the handle 267 may be made of plastic, metal, cardboard, paper, or any material

that the stiffener 250 is made of, the same as what the stiffener 256 is made of. The adhesive 271 may be made of the same material that the adhesive 251 is made of, however, a permanent adhesive at 271 would be preferable, so the stiffener 270 may be reinforced.

I will now list the advantages of the pull-handle 267, similar to the pull-handle 214 of the recovery blade assembly 206. First, the pull-handle 267 allows the end-user to pull on a stiff material 270 to more easily pull the seal assembly's 247 tail 255 tear-able material 258 of the tear subassembly 248. The original OEM seals have tails that contain an injection molded pull handle(not shown). Rather than being injection molded like the OEM pull-tab, the handle 267 is simply kiss-cut 280 through the stiffener 256 and the adhesive 257, cut through the stiffener material 250, material that otherwise would be peeled off and disposed of when installing the seal assembly 247.

A disadvantage of this built-in handle 267 is that it is adhered using the 2-sided tape/glue 251 that adheres permanently to the stiffener 250 and removably adhered to the tear-subassembly 248. Thus, if care is not taken, the handle 267 can peel off of the tear subassembly 248 at the right side 259 of the tear subassembly 248. However, this can be prevented by having the remanufacturer installing the seal assembly 247. Simply lift up the handle 267 slightly and place a small amount of glue under the stiffener portion 270 of the pull handle 267 and it will adhere better to the right side 259 of the tear material 272 on the handle 267. Another cure would be to place a small piece of tape over the handle and over the tear subassembly 248 to more permanently join those 2 sub-components. One could even tape (scotch tape for example) around the handle 267 and tear subassembly 248 to prevent the handle 267 from falling off.

If you now review Figure 3E, you can see a narrow opening 268 on the LX toner hopper 97 where the tail 89 must feed through this narrow opening 268, yet under the left-most end-felt 269. To feed this tail 258 through this narrow opening 268 is similar to threading a needle. A flexible thread has a difficult time feeding through a needle hole because it is flexible and not stiff. Similarly, the right side 259 of the seal assembly 247 of the tear-able material 252 is very flexible and lacks stiffness. By providing stiffener to the tail 258 using the stiff handle 267 made of the stiffener material 250, it is much easier to "thread the needle", is much easier to feed the tail 258 of the flexible tear subassembly 248 through the narrow constriction or channel 268 and under the left most end-felt 269 of the LX toner hopper 97 as shown in Figure 3E. Other toner hoppers have a similar problem, for example, the BX and XP5/10 toner hoppers have a narrow constriction that the tail 258must feed through in the remanufacturing of the toner cartridge, just as it does the LX toner hopper. Thus, by having a pull handle 267, it is easier to feed the end 259 of the tail 258 through any opening it must be fed through.

It is also an advantage to have a built-in handle 267 because it eliminates the need for an injection molded pull handle, as is the current practice, which also indicates to the end-user where to pull from, whereby this pull handle can be recycled, made of the tail 258 and stiffener support 270 that would otherwise be disposed of anyway. A flexible tail 258 without a handle does not have as good of an appearance as one with a handle. Also, in any case, the end-user likes and even expects to have something to pull on for the product to have a good feel and look. Also, the pull handle can have printed on it something such as "PULL", or "PULL HERE" or another such message printed right on it for the end-user 's benefit and convenience. It makes the remanufactured toner cartridge finished product look like a worthy product.

Figure 63 shows the device of Figure 62 with the middle portion 292 of the stiffener 250 removed as is done prior to use. Figure 64 shows the placement holder device 281 that will be referred to as the PHD 281. The PHD 281 has a right portion 282, a left portion 283 and a middle portion 284. The PHD 281 has a side 285, a right end 286, a left end 317, a right bend 287, a left bend 288 and a top surface 318 and a tape side 296. Figure 64 shows a placement holding device 281 (which will be referred to as a PHD 281). The PHD has 3 general layers, the top stiff layer 289, the adhesive/tape/glue/2-sided-tape layer 290, and the release liner layer 291. The adhesive/tape/glue/2-sided tape layer 290, in the preferable mode, is composed of a permanent-removable tape that sticks permanently to the PHD 281 on the left portion 283 on the bottom surface 319, and the removable portion surface of the adhesive 290 preferably touches the release liner 291 of the PHD 281. It is not totally critical that the adhesive 290 be permanent-removable as some permanent-permanent adhesives/tapes will be removable anyway, but a permanent-removable is designed to be removable scientifically. The PHD may be used for installing many devices. However, it can especially be used for installing the recovery blade assembly 206 of Figure 11C, the seal assembly 247 of Figure 63, or almost anything whatsoever. The PHD 281 may be used as a placement holding device for almost any object whatsoever, without much limit. However, the PHD 281 is particularly well adapted for installing any strip whatsoever, even more particularly for installing any strip that has a stiffener device such as the positioning support stiffener 250 shown in Figure 63 such as a seal assembly 295 as shown in detail in Figure 65 and 65A or the recovery blade assembly 206 previously shown in Figure 11C, and shown in Figure 65B. The seal assembly 295 with the PHD 281 is easy to use. The toner cartridge remanufacturer simply removes the liner 291 from the PHD and places the PHD 281 onto the seal assembly stiffener 250. Then the remanufacturer removes the adhesive

liner 266 from the seal assembly 295, grabs the holder portion 298 of the PHD 281 and uses that holder 298 to position the entire seal assembly 295. After the seal assembly 295 is put in place, the remanufacturer presses down on the seal assembly 295 to cause the adhesive to adhere to the toner hopper. Optionally, the remanufacturer may use a burnishing tool or something similar to enhance the adhesion between the seal assembly 295 and the toner hopper 97 (as shown in Figure 3E). It should be pointed out that Figure 65 shows one way of positioning the PHD 281 onto the seal assembly 295. However, as can be seen in Figure 65A, in order for the seal assembly 295 to easily fit into the toner hopper unlike the toner hopper 97, the PHD 281 could be installed 180 degrees different than that shown in Figure 65, and Figure 65A is shown as such an example. Then, the stiffener device 250 and adhesive/glue/tape 251 is to be removed from the seal assembly 295. Then, optionally, the remanufacturer may remove the PHD 281 from the remaining stiffener 250 and may re-use the PHD 281 for multiple uses. Just how many uses the PHD may be used for depends on the particulars of the adhesive/glue/tape 290 used as well as the environment. Similarly, the PHD may be used to install the recovery blade, any blade of any kind, any strip of any kind, and much more.

Figure 65B shows a recovery blade assembly 206A, similar to the recovery blade assembly 206 of Figure 11C. The only difference between the two recovery blade assemblies 206 and 206A is that the recovery blade assembly 206A has a PHD 281 attached to the stiffener device 211. With this assembly 206A, the installer first removes the liner 291 of the PHD 281 and places the PHD 281 onto the stiffener support 211 of the recovery blade assembly 206A. The installer then removes the adhesive liner 207 of the recovery blade assembly 206A. Then the installer may grab the recovery blade assembly 206A by the holder 298 to install the recovery blade

assembly 206A onto a waste toner hopper 2 as shown in Figures 10, 11A, 11B and Figure 12. Then the installer should press on the recovery blade edge to help adhere the recovery blade assembly 206A to the waste toner hopper 2. Then the installer should grab the recovery blade assembly 206A by the handle 214 and remover the stiffener 211 and adhesive 210 leaving only the recovery blade portion 209 in the waste toner hopper 2. Of course, the PHD 281 may be removed either prior to or after removing the stiffener 211 and removable adhesive 210 for further re-use. In grabbing the recovery blade assembly 206A handle 214, the installer may bend the recovery blade assembly 206A at the kiss-cut 220 in order to ease installation of the blade assembly 206A and removal of the stiffener 211 and adhesive 210, and this bending may be done either before or after installation of the recovery blade assembly 206A into the waste toner hopper 2.

Figure 66 shows a packaging configuration system for the PHD where the PHD's are grouped in multiples for easy and quick manufacturing. In this first configuration, a PHD grouping 299 is shown, with many PHD's 281 grouped together in one manufacturing unit 299. Each PHD 281 is adhered to with one common tape 300 or other material with adhesion. The adhesive liner 301 is shown as a byproduct, but the tape/ adhesive/glue/2-sided-tape 300 is not required to be 2-sided as one-sided tape will also work well, but in some cases, it may be preferred to use 2-sided tape. Then when the toner cartridge remanufacturer uses a PHD, all he/she has to do is to peel, tear, cut or otherwise remove one PHD 281 off the grouping 299 of PHD's 281, remove the protective liner 291 and begin use, as already described. The packaging style 299 of Figure 66 can be desirable for ease of manufacture and also for ease of the installer to remove the PHD 281 from the grouping 299. Note that the adhesive 290 is removable on the side that does not adhere to the PHD, while the adhesive 300 that

adheres to the PHD is preferably the removable side of the adhesive so that the PHD 281 will easily peel off the adhesive strip 300. Other configurations of grouping are possible as shown in Figure 66A. For example, the adhesive 300 and liner 301 can be on either surface of the PHD, i.e. top or bottom, for example Figure 69 shows the adhesive/tape/glue 312 and liner 313 on the opposite surface of the PHD grouping . Also, the PHD grouping 302 does not require the adhesive 300 and liner 301 and uses the adhesive 303 and liner 304 to hold the grouping 302 together. This takes less labor and material. The difference is not only that the PHD grouping 302 does not use the adhesive 300 and liner 301, but also that the PHD grouping 302 uses the adhesive 303 and liner 304 and the liner strip 304 holds the group 302 together and may be manufactured in a continuous operation. The adhesive 303 is kiss-cut 322 up to the liner 304 which is continuous. Typically in order to achieve this design, the kiss-cut 322 goes slightly through the liner 304, but only enough that the adhesive/glue/2-sided-tape 303 and stiff portion is cut through all the way. Figure 67 is a configuration 309 that may be a previous step in manufacture of the grouping 299. The adhesive strips 305 and 306 and their liners 307 and 308 are continuously laminated onto the stiff plastic/cardboard/metal material 310 of the pre-manufactured PHD group 309. Then this strip is kiss-cut appropriately to generate the groupings 314 shown in Figure 68. Then, the grouped material 309, after being cut and kiss-cut forms the continuous configuration 314 is bent to form the PHD group 299 shown in Figure 66.

Figure 67A shows the continuous in-process configuration 323 used as a previous step in the manufacture of the PHD 281 group 302. The stiff material 326 may be continuously laminated with a glue/tape/adhesive/2-sided-tape 324 with a liner 325 forming the in-process configuration 323. This in-process configuration 323 may be

continuously cut and kiss-cut to form the further along in-process configuration 327 shown in Figure 68A. All PHD's 281A (not yet bent) attach to one common continuous liner 328 that protects the 2-sided-tape/adhesive/glue/tape portions 329. This liner 328 connects all PHD's in one continuous string 327 of PHD's and all the installer needs to do is to peel any individual PHD 281A from the group 327 for easier use than to have to peel off a little piece of liner 241 from an individual PHD 281 (Fig 64) for easier use. Of course, each PHD 281A grouping 327 should be bent to form PHD 281B group 302. Thus, the PHD 281B group may be formed in a process described, starting with a strip 326 lines with a tape 324 with a liner 325 to form a continuous strip 323 which in turn is kiss-cut to form the continuous strip 327 with little unbent PHD's 281A which may be bent either continuously or in batch to form the PHD 281B group 302.

The seal assemblies 247 of Figures 62 and 63 may be alternately made as shown in Figures 70-71. The seal-insert assembly 249 may be placed on the seal-assembly 247 without the bottom release liner 266. This adhesive/glue/2-sided-tape 265 may be adhered to the assembly 247. Then a group 315 of seal-assemblies 247 may be installed on one big release liner 316. Peeling off the seal-assembly 247 of from the release paper 316 exposes the adhesive 265 for use and is much easier than peeling off the release liner 266 of Figures 62-63. It is tedious to peel off the release liner 266 requiring good fingernails. This is not fun to do. But instead, peeling the seal-assembly 247 from the release liner sheet 316, a seal-assembly package group 315 is an improvement of convenience to the remanufacturers and OEMs who may desire to use these seal-assemblies 247. The adhesive/tape 265 may be placed on the seal assemblies 247 in gangs and then sheets of release paper 316 may be used to receive these seal-assemblies 247 for production manufacturing of these seal-assembly

groupings 315. Furthermore, the sheet of release paper can be a release paper on one side, the side that touches the adhesive 265 of the seal assemblies 257, and the reverse side can be a printable paper that is not a release or silicone type paper. This printable side can have anything printed on it. For example, the back side of the release paper can have the licensing Agreement of the remanufacturer on it, it could have the instructions and/or tips written on it, or both a Licensing Agreement and instructions may be printed on the reverse side of the release paper. Anything whatsoever, or nothing may be printed on the reverse side of the release paper.

Since minor changes and modifications varied to fit particular operating requirements and environments will be understood by those skilled in the art, the invention is not considered limited to the specific examples chosen for purposes of illustration. The invention includes all changes and modifications which do not constitute a departure from the true spirit and scope of this invention as claimed in the following claims and as represented by reasonable equivalents to the claimed elements.